Copeland®

Electrical Handbook

Revised December 1, 1977

Copeland®

COPELAND CORPORATION, SIDNEY, OHIO 45365

Revised December 1, 1977

FOREWORD

The progress of Copeland, as well as that of refrigeration and air conditioning in general, has been greatly aided by good field service. Everyone at Copeland recognizes and appreciates the important contribution of the service engineer upon whose talents we and all refrigeration equipment manufacturers depend to assure complete user satisfaction.

This booklet covers in detail electrical service information on both Copelametic and Copelaweld motor compressors. It is designed to assist the service engineer to better understand the function of such items as motors, relays, starting capacitors, running capacitors and motor protectors.

INDEX

SINGLE PHASE MOTORS

There are four basic types of single phase motors used in hermetic motor compressors: split phase, permanent split capacitor, capacitor start - induction run, and capacitor start - capacitor run. Schematic diagrams of each type are shown in Figures 1, 2, 3 and 4.

A current relay is normally open when de-energized, and the coil is wound so that the contacts will close when starting current is being drawn by the motor, but will drop out when the current approaches normal full load conditions. Therefore, the current relay is closed only during the starting cycle.

A potential relay is normally closed when de-energized, and the coil is designed to open the contacts only when sufficient voltage is generated by the start winding. Since the voltage or back-EMF generated by the start winding is proportional to the motor speed, the relay will open only when the motor has started and is approaching normal running speed. The illustrations show the schematic wiring with the motor in operation so the potential relay is in the energized position.

RUN CAPACITORS

Run capacitors are continuously in the operating circuit, and are normally of the oil filled type. Because of the voltage generated in the motor start winding, the run capacitor has a voltage across its terminals greater than line voltage.

The starting winding of a motor can be damaged by a shorted and grounded running capacitor. This damage usually can be avoided by proper connection of the running capacitor terminals.

The terminal connected to the outer foil (nearest the can) is the one most likely to short to the can and be

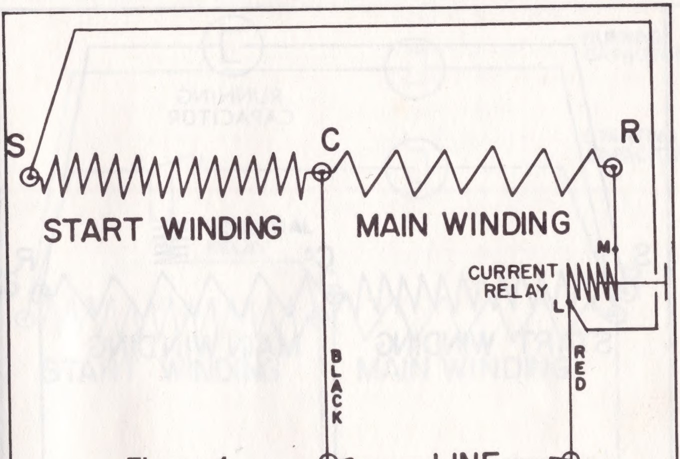


Figure 1

SPLIT PHASE MOTOR

grounded in the event of a capacitor breakdown. It is identified and marked by most manufacturers of running capacitors. See Fig. 5.

From the supply line on a typical 115 or 230 volt circuit, a 115 volt potential exists from the "R" terminal to ground through a possible short in the capacitor. (See wiring diagram Fig. 6.) However, from the "S" or start terminal, a much higher potential, possibly as high as 400 volts, exists because of the EMF generated in the start winding. Therefore, the possibility of capacitor failure is much greater when the identified terminal is connected to the "S" or start terminal.

THE IDENTIFIED TERMINAL SHOULD ALWAYS BE CONNECTED TO THE SUPPLY LINE, OR "R" TERMINAL, NEVER TO THE "S" TERMINAL. This applies to PSC as well as capacitor-start, capacitor-run motors.

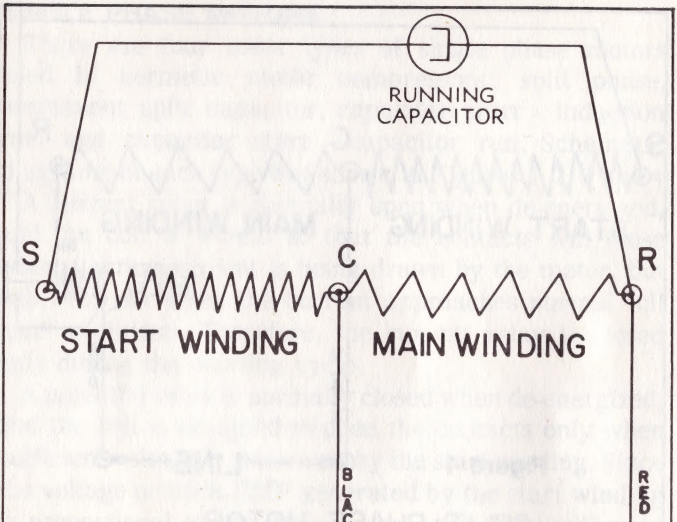


Figure 2

(PSC)

PERMANENT SPLIT CAPACITOR MOTOR

If connected in this manner, a shorted and grounded running-capacitor will result in a direct short to ground from the "R" terminal and will blow line fuse No. 1. The motor protector will protect the main winding from excessive temperature.

If, however, the shorted and grounded terminal is connected to the start winding terminal "S", current will flow from the supply line through the main winding and through the start winding to ground. Even though the protector may trip, current will continue to flow through the start winding to ground, resulting in a continuing temperature rise and failure of the starting winding.

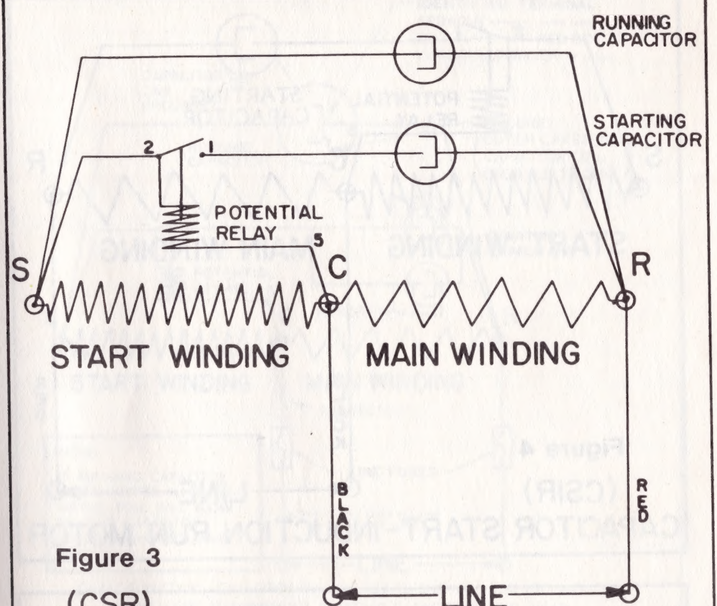


Figure 3

(CSR)

CAPACITOR START-CAPACITOR RUN MOTOR

START CAPACITORS

Start capacitors are designed for intermittent service only, and have a high MFD rating. Their construction is of the electrolytic type in order to obtain the high capacity.

All standard Copeland starting-capacitors are supplied with bleed-resistors securely attached and soldered to their terminals as shown in Fig. 7.

The use of capacitors without these resistors probably will result in sticking relay contacts and/or erratic relay operation — especially where short cycling is likely to occur.

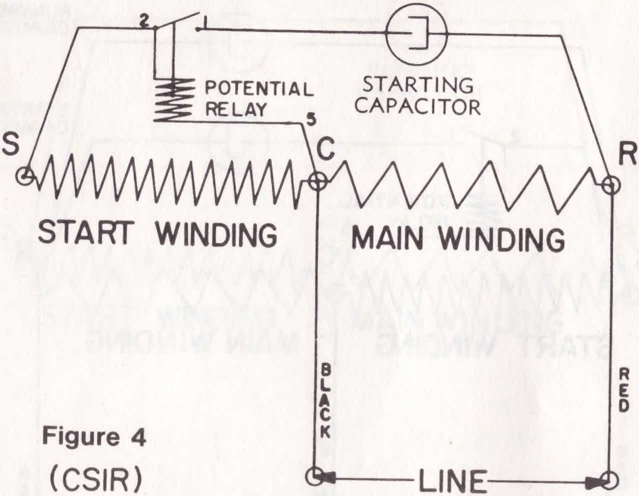
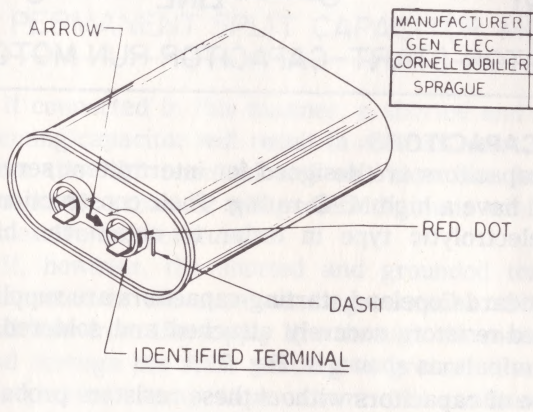
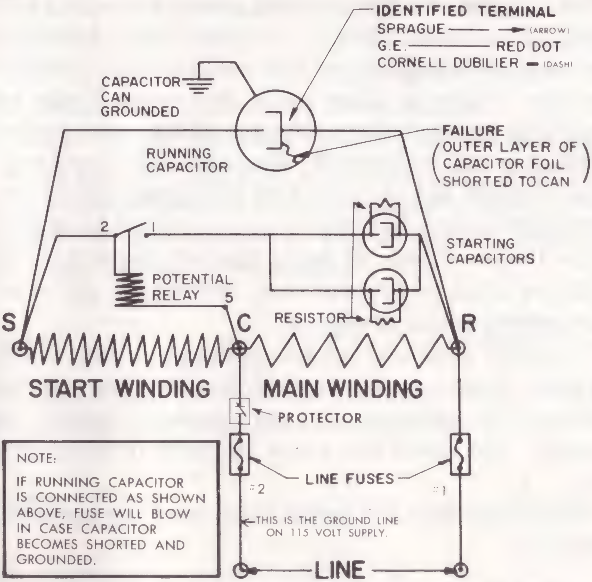


Figure 4
(CSIR)
CAPACITOR START-INDUCTION RUN MOTOR



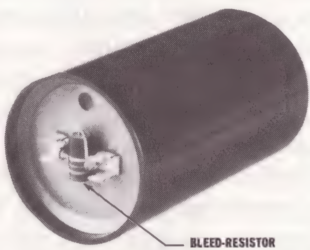
MANUFACTURER	MARKING
GEN ELEC	DOT
CORNELL DUBILIER	DASH
SPRAGUE	DOT OR ARROW

RUN CAPACITOR
Figure 5



CAPACITOR-START, CAPACITOR-RUN MOTOR IS SHOWN. THE PSC MOTOR IS THE SAME BUT WITHOUT STARTING-CAPACITORS AND RELAY.

CAPACITOR WIRING DIAGRAM
Figure 6



STARTING CAPACITOR WITH BLEED-RESISTOR
Figure 7

This is due to the starting capacitor discharging through the relay contacts as they close, following a very short running cycle. The resistor will permit the capacitor charge to bleed down at a much faster rate, preventing arcing and overheating of the relay contacts.

The use of capacitors supplied by Copeland is recommended, but in case of an emergency exchange, a 15,000-18,000 ohm, two watt resistor should be soldered across the terminals of each starting capacitor. Care should be taken to prevent their shorting to the case or other nearby metallic objects.

If sticking contacts are encountered on any starting relay the first item to check is the starting capacitor resistors. If damaged, or not provided, install new resistors, and clean the relay contacts or replace the relay.

Suitable resistors can be obtained from any radio parts wholesaler.

CAPACITOR VOLTAGE

The voltage rating of a capacitor indicates the nominal voltage at which it is designed to operate. Use of a capacitor at voltages below its rating will do no harm. Run capacitors must not be subjected to voltages exceeding 110% of the nominal rating, and start capacitors must not be subjected to voltages exceeding 130% of the nominal rating. The voltage to which a capacitor is subjected is not line voltage, but is a much higher potential (often called electromotive force or back EMF) which is generated in the start winding. On a typical 230 volt motor, the generated voltage may be as high as 450 volts, and is determined by the start winding characteristics, the compressor speed, and the applied voltage.

PARALLEL OR SERIES CAPACITOR CONNECTIONS

Capacitors, either start or run, can be connected either in series or parallel to provide the desired characteristics if the voltage and MFD are properly selected. When two capacitors having the same MFD rating are connected in series, the resulting total capacitance will be one half the rated capacitance of a single capacitor. The formula for determining capacitance (MFD) when capacitors are connected in series is as follows:

$$\frac{1}{\text{MFD total}} = \frac{1}{\text{MFD}_1} + \frac{1}{\text{MFD}_2}$$

For example, if a 20 MFD and a 30 MFD capacitor are connected in series, the resultant capacitance will be

$$\frac{1}{\text{MFD t}} = \frac{1}{\text{MFD}_1} + \frac{1}{\text{MFD}_2}$$

$$\frac{1}{\text{MFD t}} = \frac{1}{20} + \frac{1}{30}$$

$$\frac{1}{\text{MFD t}} = \frac{5}{60} = \frac{1}{12}$$

$$\text{MFD t} = 12 \text{ MFD}$$

The voltage rating of similar capacitors connected in series is equal to the sum of the voltage of the two capacitors. However, since the voltage across individual capacitors in series will vary with the rating of the capacitor, for emergency field replacements it is recommended that only capacitors of like voltage and capacitance be connected in series to avoid the possibility of damage due to voltage beyond the capacitor limits.

When capacitors are connected in parallel, their MFD rating is equal to the sum of the individual ratings. The voltage rating is equal to the smallest rating of the individual capacitors.

It is possible to use any combination of single, series, or parallel starting capacitors, with single or parallel running capacitors (running capacitors are seldom used in series).

DUAL VOLTAGE THREE PHASE MOTORS

Certain Copeland three phase motors are wound with two identical stator windings which are connected in parallel on 208 or 220 volt operation, and in series for 440/480 volt operation. Internal connections of this type of motor are shown in Figures 8 and 8A.

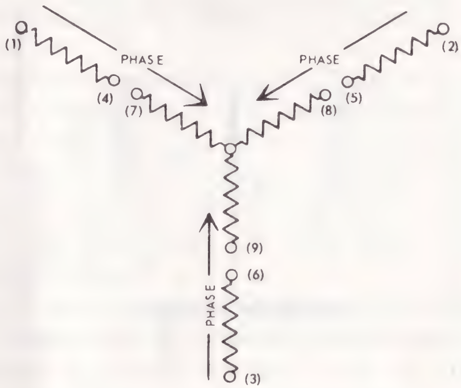
These models have two separate windings with nine leads which must be connected correctly for the voltage of the power supply. If the windings are connected out of phase, or if the jumper bars are not positioned correctly, motor overheating and possible failure can occur.

FUSES AND CIRCUIT BREAKERS

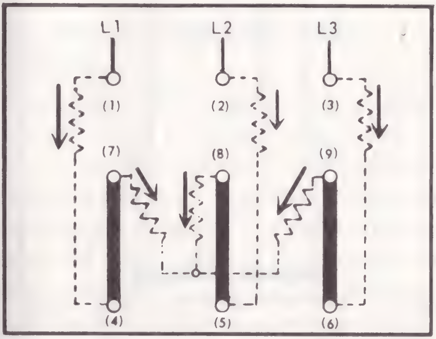
On air conditioners having motor compressors with PSC motors, it is possible that nuisance tripping of household type circuit breakers may occur. PSC motors have very low starting torque, and if pressures are not equalized at start up, the motor may require several seconds to start and accelerate.

This is most apt to occur where a short cycle of the compressor can be caused by the thermostat making contact prematurely due to shock or vibration. Typically this can occur where the thermostat is wall mounted and can be jarred by the slamming of a door.

U.L. and most electrical inspection agencies now require that hermetic type refrigeration motor compressors must comply with the National Electric Code maximum fuse sizing requirement. This establishes the maximum fuse size at 225% of the motor full load current, and by definition the motor compressor

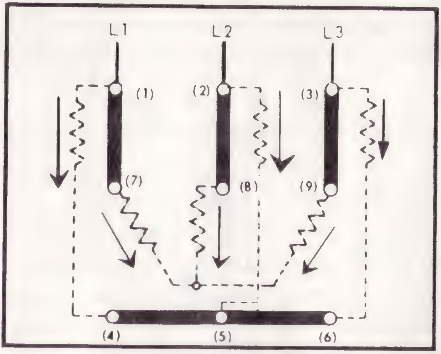


Schematic wiring diagram showing the terminal positions and phase relation.

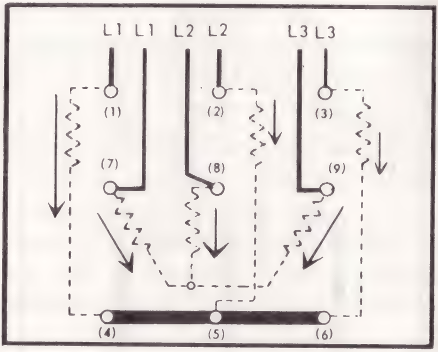


Internal connection of the motor with terminal jumpers positioned for 440/480 volt across-the-line start.

DUAL VOLTAGE MOTOR WINDINGS
Figure 8



Internal connection of the motor with terminal jumpers positioned for single contactor 208/220 volt across-the-line start.



Internal connection of the motor with terminal jumpers positioned for 208/220 volt across-the-line start with two contactors, or part-winding start.

DUAL VOLTAGE MOTOR WINDINGS
Figure 8A

nameplate amperage is considered full load current, unless this rating is superseded by another on the unit nameplate.

Since the motor protector may take up to 17 seconds to trip if the compressor fails to start, it is probable that a standard type fuse or circuit breaker sized on the basis of 225% of full load current may break the circuit prior to the compressor protector trip, since locked rotor current of the motor may be from 400% to 500% of nameplate amperage.

To avoid nuisance tripping, Copeland recommends that air conditioners with PSC motors be installed with branch circuit fuses or circuit breakers sized as closely as possible to the 225% maximum limitation, the fuse or circuit breaker to be of the time delay type with a capability of withstanding motor locked rotor current for a minimum of 17 seconds.

MEASURING MOTOR TEMPERATURES BY RESISTANCE

During engineering development or in attempting to evaluate the ability of a compressor motor to operate under severe conditions, it is often desirable to measure motor temperatures under extreme conditions. In the laboratory during compressor development, temperature measurements of this type are made by means of thermocouples installed in the motor windings, with the leads brought out through gasketed surfaces.

In evaluating a production compressor in a system, thermocouple readings are not usually feasible, and the only means of checking motor temperatures is by checking resistance values.

The resistance through the motor windings varies in a fixed ratio to a change in temperature. By establishing

a base resistance value at a given base temperature, normally room temperature after storage for a prolonged period without operation, any change in the temperature of the motor windings can be calculated by determining the change in winding resistance. The resistance method, since it reads the overall resistance of the winding, is an average reading, and does not accurately reflect the temperature that might exist at hot spots. In some cases there may be hot spots that can reach temperatures of 40°F. or more above the average reading, so resistance readings must be evaluated very conservatively.

Motors may be wound with either copper or aluminum wire, and it is necessary to know the motor construction since the resistance change varies depending on the type of wire. The basic formula for calculating winding temperature is as follows:

$T_h = (R_h/R_c)\ (T_c+K) - K$

T_h = Temperature hot

T_c = Temperature cold

R_h = Resistance hot, ohms

R_c = Resistance cold, ohms

K copper = 390.1 for °F, 234.5 for °C

K aluminum = 365.8 for °F, 221.0 for °C

COPELAWELD® COMPRESSOR MODEL NUMBER NOMENCLATURE

X X X X – X X X X – X X X – X X X

APPLICATION RANGE

CODE	DESCRIPTION
E	HIGH EFFICIENCY-HIGH TEMP.
R	HIGH TEMPERATURE
S	MEDIUM TEMPERATURE
F	LOW TEMPERATURE
H	HEAT PUMP

COMPRESSOR MOTOR TYPE

MOTOR TYPE	CODE
CAPACITOR RUN - CAPACITOR START (1 Ø)	C
INDUCTION RUN - CAPACITOR START (1 Ø)	I
SPLIT PHASE - INDUCTION START & RUN (1 Ø)	S
LOW TORQUE - CAP. START, IND. RUN (1 Ø)	X
PERM. SPLIT CAP. - CAP. START, CAP. RUN (1 Ø)	P
THREE PHASE - (EXCEPT CODE E)	T
TWO PHASE - (ALL)	D
WYE (STAR) - DELTA MOTOR (3 Ø)	E
THREE PHASE - 6 LEAD MOTORS ONLY (EXCEPT 575V.)	F

PRODUCT VARIATIONS

NUMBER WILL BE ASSIGNED AS FOLLOWS

1. NUMBER 001 THROUGH 199 ARE RESERVED FOR SUB B/M NUMBERS
2. NUMBER 200 INDICATES A STANDARD COMPRESSOR B/M AND MODEL NO.
3. NUMBERS 201 AND LARGER WILL BE ASSIGNED FOR ALL OTHER VARIATIONS OF A GIVEN MODEL.

COMPRESSOR

FAMILY SERIES

EITHER A NUMBER OF A LETTER ESTABLISHED FOR EACH PRODUCT MODEL.

DISPLACEMENT

A LETTER ONLY, ARBITRARILY ASSIGNED FOR EACH DIFFERENT DISPLACEMENT WITHIN ANY ONE FAMILY SERIES.

MODEL SERIES VARIATIONS

A NUMBER ONLY, ARBITRARILY ASSIGNED TO INDICATE DIFFERENT MODEL TYPES WITHIN ANY ONE FAMILY SERIES.

COMP. MOTOR RATING

NOMINAL H.P.	CODE
1/12	0008
1/10	0010
1/8	0013
1/6	0017
1/5	0020
1/4	0025
1/3	0033
1/2	0050
3/4	0075
1	0100
1-1/4	0125
1-1/2	0150
1-3/4	0175
2	0200
2-1/4	0225
2-1/2	0250
2-3/4	0275
3	0300
3-1/2	0350
4	0400
5	0500
6	0600
7-1/2	0750
9	0900
10	1000
12	1200

COMPRESSOR MOTOR PROTECTION

TYPE PROTECTION	CODE
EXTERNAL INHERENT PROTECTION - ONE PROTECTOR (SEIP) (LINE BREAK) USE WITH CONTACTOR (SINGLE OR THREE PHASE)	A *
EXTERNAL THERMAL PROTECTION USE WITH STARTER AND HEATER ELEMENT (THREE PHASE)	B
COMBINATION - PROTECTOR AND STARTING RELAY SINGLE PHASE (KELVINATOR TYPE MODELS)	E
INTERNAL INHERENT PROTECTION - ONE PROTECTOR (IIP) USE WITH CONTACTOR (SINGLE OR THREE PHASE)	F *
INTERNAL THERMOSTAT (s); AND EXT. SUPPLEMENTARY PROTECTOR (s) MT'D. ON COMPRESSOR. (TWO FOR 3 Ø, ONE FOR 1 Ø). USE WITH CONTACTOR	H *
INTERNAL INHERENT PROTECTION (PILOT DUTY) USE WITH CONTACTOR	K *
INTERNAL THERMOSTAT (s); AND THREE EXT. SUPPLEMENTARY PROTECTORS MT'D. ON COMPRESSOR. USE WITH CONTACTOR	L *
INTERNAL THERMAL PROTECTORS - ANTICIPATING TYPE (PILOT DUTY). USE WITH CONTACTOR (G.E. THERMOTECTORS)	M *
INTERNAL INHERENT PROTECTION (LINE BREAK) PLUS INTERNAL PILOT DUTY THERMOSTAT USE WITH CONTACTOR	N *
INTERNAL THERMAL PROTECTORS - ELECTRONIC SENSORS; AND CONTROL MODULE EXTERNAL. USE WITH CONTACTOR	S *

* THERMALLY PROTECTED MARKED ON COMPRESSOR NAMEPLATE.

ELECTRICAL CODES

60 Hz.	*50 Hz. (Typical)	Code
115-1	100-1	A
230-1	200-1	B
208/230-3	200/220-3	C
460-3	380/400-3	D
575-3	500-3	E
--	115-1	F
--	230-1	G
208-1	200-1	H
--	208/230-1	I
265-1	220/240-1	J
208/230/460-3	200/400-3	K
--	210/240/380-3	L
--	380/420-3	M
230/460-3	200/400-3	N
ALL D.C. RATINGS		O
--	200/380-3	P
--	200/240-3	R
	220-1	S
	200-1	T
200-3		U
208/230-1	200-1	V
	200/220-3	W
MISCELLANEOUS A.C. RATINGS		X
	500-3	Y
	220/240-1	Z
200-1	200-1	3
100-1	100-1	4

*NOTE When applicable, specific 50 Hz ratings (not necessarily identical to typical shown above) will be shown as alternate on 60 Hz rated models.

Copeland®
COPELAND CORPORATION SIDNEY OHIO 45365

COPELAMETIC COMPRESSOR MODEL TYPE

Air-Cooled

Code	Description
A =	Std. Air Cooled
B =	Extended Shaft

Refrigerant-Cooled

Code	Description
R =	Std. Refrig. Cooled
J =	Extended Shaft

Water-Cooled

Code	Description
W =	Std. Water Cooled

Two Stage

Code	Description
T =	Std. Two Stage

Tandem Style Models

Indicated by the digit representing the comp. model series connected in TANDEM with a comp. of the model series indicated by the first digit.

COMPRESSOR MOTOR TYPE

Comp. Motor Type	Code
Capacitor Run - Capacitor Start (1 Ø)	C
Induction Run - Capacitor Start (1 Ø)	I
Split Phase - Induction Start & Run (1 Ø)	S
Low Torque - Cap. Start, Ind. Run (1 Ø)	X
Perm. Split Cap. - Cap. Start, Cap. Run (1 Ø)	P
Three Phase - (Except Code E)	T
Two Phase - (All)	D
Wye (Star) - Delta Motor (3 Ø)	E
Three Phase - 6 Lead Motors Only (Except 575V.)	F

PRODUCT VARIATIONS

Numbers will be assigned as follows:

1. Numbers -001 through -199 are reserved for Sub-B/M Numbers.
2. Number -200 indicates a STANDARD Compressor and Component Parts B/M and Model No.
3. Numbers -201 and larger will be assigned for all other variations of a given model.

X X X X — X X X X — X X X — X X X

COMPRESSOR

Family Series

Either a number or a letter established for each product model.

DISPLACEMENT AND VALVE PLATE

A letter only, arbitrarily assigned for each different displacement-valve plate combination within any one family series (Column 1)

MODEL VARIATIONS

A number assigned to indicate major variations within any one family series.

COMP. MOTOR RATING

Nominal (H.P.)	Code
1/12	0008
1/10	0010
1/8	0013
1/6	0017
1/5	0020
1/4	0025
1/3	0033
1/2	0050
3/4	0075
1	0100
1-1/4	0125
1-1/2	0150
1-3/4	0175
2	0200
2-1/2	0250
2-3/4	0275
3 (0310)	0300
3-1/2	0350
4	0400
5	0500
6	0600
7-1/2 (0760)	0750
9	0900
10 (1010)	1000
12	1200
15	1500
20	2000
25	2500
30	3000
35	3500
40	4000
50	5000
60	6000
75	7500
100	1100

COMPRESSOR MOTOR PROTECTION

Type Protection	Code
External Inherent Protection - One Protector (SEIP) (Line Break) Use with Contactor (Single or Three Phase)	A *
External Thermal Protection. Use with Starter and Heater Element (Three Phase)	B
Internal Thermostat (s); and External Amb. C'pensated Protector (s) and Contactor Assembly. Mt'd. Remote	D
Internal Inherent Protection - One Protector (IIP). Use with Contactor (Single or Three Phase)	F *
External Inherent Protection - Two Protectors (EIP). Use with Contactor mt'd. on Compressor (Three Phase)	G
Internal Thermostat (s); and Ext. Supplementary Protector (s) mt'd. on Compressor. (Two For 3 Ø, One For 1 Ø. Use with Contactor.	H *
Internal Inherent Protection (Pilot Duty). Use with Contactor	K *
Internal Thermostat (s); and Three Ext. Supplementary Protectors mt'd. on Compressor. Use with Contactor	L *
Internal Thermal Protectors - Anticipating Type (Pilot Duty). Use with Contactor (G.E. Thermotector)	M *
Internal Thermal Protectors - Electronic Sensors; and Control Module External. Use with Contactor	S *

*Thermally protected marked on compressor nameplate.

ELECTRICAL CODES

60 Hz.	*50 Hz. (Typical)	Code
115-1	100-1	A
230-1	200-1	B
208/230-3	200/220-3	C
460-3	380/400-3	D
575-3	500-3	E
--	115-1	F
--	230-1	G
208-1	200-1	H
--	208/230-1	I
265-1	220/240-1	J
208/230/460-3	200/400-3	K
--	210/240/380-3	L
--	380/420-3	M
230/460-3	200/400-3	N
ALL D.C. RATINGS		O
--	200/380-3	P
--	200/240-3	R
--	220-1	S
--	200-1	T
200-3	--	U
208/230-1	200-1	V
--	200/220-3	W
MISCELLANEOUS A.C. RATINGS		X
--	500-3	Y
--	220/240-1	Z

*NOTE: When applicable, specific 50 Hz ratings (not necessarily identical to typical shown above) will be shown as alternate on 60 Hz ~~rated models~~.

Copeland Corporation
Engineering Division
Sidney, Ohio

COPELAMETIC COMPRESSOR



SERIES TYPE *

Code R-12	Description	Code R-22 R-502
S	Standard	2
C	2nd Standard	3
D	3rd Standard	4
etc	etc	etc
X	Non-Standard (Special)	9

* Basic component combinations (Compressor, Receiver, Condenser, Base)

REFRIGERANT COOLING

Type of Cooling	Code
Air	A
Water & Air Comb.	C
No Condenser	N
Water	W

COMPRESSOR MOTOR TYPE

Compressor Motor Type	Code
Capacitor Run – Capacitor Start (1 Ø)	C
Induction Run – Capacitor Start (1 Ø)	I
Split Phase – Induction Start & Run (1 Ø)	S
Low Torque – Cap. Start, Ind. Run (1 Ø)	X
Perm. Split Cap. – Cap. Start, Cap. Run (1 Ø)	P
Three Phase	T
Two Phase – (All)	D
Direct Current	W
Three Phase – 6 Lead Motors Only (Except 575V.)	F

PRODUCT VARIATIONS

1. Remote Style Units & Self Contained Style

001 thru 099	Eligible for UL and CSA
100 thru 299	Eligible for CSA Only
300 thru 399	Not eligible for either UL or CSA

CONDENSING UNIT

Model Series

A symbol that identifies the Model Series.

APPLICATION TEMP.

Temp. Range	Code
High Temperature 45°F max.; 0°F min.	H
Medium Temperature 25°F max.; -5°F min.	M
Low Temperature 0°F max.; -40°F. min.	L
Extra Low Temperature -20°F max.; -40°F min.	E
Two Stage 0°F max.; -40°F min.	T
Two Stage (extra low) -30°F max.; -80°F min.	U

COND. UNIT RATING

Nominal H.P.	Code
1/12	0008
1/10	0010
1/8	0013
1/6	0017
1/5	0020
1/4	0025
1/3	0033
1/2	0050
3/4	0075
1	0100
1-1/2	0150
2	0200
2-1/2	0250
3	0300
3-1/2	0350
4	0400
5	0500
6	0600
7-1/2	0750
10	1000
15	1500
20	2000
25	2500
30	3000
40	4000
50	5000
75	7500
100	1100

COMPRESSOR MOTOR PROTECTION

Type Protection	Code
External Inherent Protection – One Protector (SEIP) (Line Break) Use with Contactor (Single or Three Phase)	A *
External Thermal Protection Use with Starter and Heater Element (Three Phase)	B
Internal Thermostat (s); and External Amb. C'pensated Protector (s) and Contactor Assembly. Mt'd. Remote	D
Combination – Protector and Starting Relay Single Phase (Kelvinator Type Models)	E
Internal Inherent Protection – One Protector (IIP) Use with Contactor (single or Three Phase)	F *
External Inherent Protection – Two Protectors (EIP) Use with Contactor mt'd. on Compressor (Three Phase)	G
Internal Thermostat (s); and Ext. Supplementary Protector (s) mt'd. on Compressor. (Two For 3 Ø, One For 1 Ø). Use with Contactor	H *
Magnetic Across-The-Line Starter (Belt Drive Unit Models Only)	J
Internal Inherent Protection (Pilot Duty) Use with Contactor	K *
Internal Thermostat (s); and Three Ext. Supplementary Protectors mt'd. on Compressor. Use with Contactor	L *
Internal Thermal Protectors – Anticipating Type (Pilot Duty). Use with Contactor (G.E. Thermotector)	M *
Internal Thermal Protectors – Electronic Sensors; and Control Module External. Use with Contactor.	S *

*Thermally protected marked on compressor nameplate.

ELECTRICAL CODES

60 Hz.	50 Hz.	Code
115-1	--	A
230-1	--	B
208/230-3	--	C
460-3	--	D
575-3	--	E
--	115-1	F
--	230-1	G
208-1	--	H
--	208/230-1	I
265-1	--	J
208/230/460-3	--	K
--	210/240/380-3	L
--	380/420-3	M
230/460-3	--	N
ALL D.C. RATINGS		O
--	200/380-3	P
--	200/240-3	R
--	220-1	S
--	200-1	T
200-3	--	U
208/230-1	--	V
--	200/220-3	W
MISCELLANEOUS A.C. RATINGS		X
--	500-3	Y
--	220/240-1	Z

CONDENSING UNIT

POTENTIAL RELAY NOMENCLATURE

Both General Electric and RBM have somewhat complicated numbering systems for potential relays, of necessity since there are so many different features to be described. Without a complete catalog, the numerical designations are not self-explanatory, but a basic understanding of the nomenclature is helpful in identifying potential replacements in an emergency situation.

RBM NUMBERING SYSTEM

A typical RBM potential relay number is as follows: 128146-1653DK

128 14 6 - 16 5 3 D K

- K — Customer marking
- D — Coil Setting
- 3 — Mounting Position
- 5 — Coil Rating
- 16 — Base Arrangement
- 6 — Pole Form
- 14 — Type of Mounting
- 128 — Potential Relay

G.E. NUMBERING SYSTEM

A typical G.E. potential relay number is as follows: 3ARR3CT6D5

3ARR3 CT 6 D 5

- 5 — Mounting Position
- D — Electrical Specifications
- 6 — Coil Rating
- CT — Mounting Bracket & Terminal Connection
- 3ARR3 — Type of Relay

ELECTRICAL DATA AND COMPONENTS

The electrical data is listed as an aid to the serviceman in determining compressor characteristics.

Due to recent changes in U.L. requirements based on the National Electric Code, the terms nameplate amperage and full load amps are now being replaced by the term "rated load amps". The value shown on the compressor nameplate is complicated by the fact that while a normal operating amperage draw can be determined on a complete system by test, a compressor could really have an infinite number of operating conditions depending on its application.

In order to provide a uniform basis for nameplate values, Copeland will establish "rated load amp" values for each compressor arbitrarily on the basis of 71% of the maximum continuous current allowed by the motor protection system. This will allow the compressor motor to draw 140% of the rated load amp value prior to the protector tripping.

Rated load amp value will be marked on Copelametic compressor nameplates unless otherwise specified by an equipment manufacturer, but in line with general industry practice, no rated load amp value will be marked on Copelaweld nameplates.

Since one motor design may be used in a number of different compressor models using different refrigerants for different operating ranges, the rated load amp value shown in the handbook may vary from the value marked on individual compressor nameplates. The handbook value is usually selected as the highest nameplate value used for a given motor, so it is always a conservative value that may be safely used in the event exact nameplate values are not known.

ELECTRICAL DATA
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
HAF -0025- IAA	115/1/60	3.9	23.0	FRN-8	15	4.53	1.84
HAJ SAA	115/1/60	3.9	22.5	FRN-8	15	17.24	1.90
HAK IAB	230/1/60	2.3	12.2	FRN-4	15	17.87	7.26
IAF	115/1/50	4.4	28.2	FRN-8	15	2.61	1.91
IAG	230/1/50	2.2	14.2	FRN-4	15	10.43	7.39
HAF -0033- IAA	115/1/60	5.4	31.0	FRN-9	15	3.15	1.31
HAJ XAA	115/1/60	5.0	22.8	FRN-9	15	11.32	1.33
HAK IAB	230/1/60	2.5	12.0	FRN-4	15	12.48	5.20
HAT CAF	115/1/50	4.9	28.6	FRN-8	15	5.14	1.79
CAG	230/1/50	2.5	14.5	FRN-4	15	20.6	7.35
HAF -0050- IAA	115/1/60	6.6	43.5	FRN-12	15	2.32 - 2.67	.90 - 1.03
HAJ IAB	230/1/60	4.0	20.2	FRN-7	15	9.88	3.82
HAK							
HAT							
KAE -0050- IAA	115/1/60	7.8	45.0	FRN-15	15	2.19 - 2.61	.83 - 1.02
KAG IAH	208/1/60	4.1	25.5	FRN-8	15	7.68 - 8.84	2.86 - 3.30
KAH IAB	230/1/60	4.1	22.5	FRN-7	15	9.01 -10.37	3.24 - 3.73
KAM TAC	208-230/3/60	1.9	13.2	FRN-3½	15		7.0
KAN CAF	115/1/50	7.1	45.2	FRN-12	15	2.03 - 2.33	.92 - 1.06
CAG	230/1/50	3.4	23.3	FRN-6	15	5.96 - 6.85	3.60 - 4.14
KAA -0075- CAA	115/1/60	6.8	44.0	FRN-12	15	7.14	.68
KAG IAA	115/1/60	10.2	59.8	FRN-20	20	1.30 - 1.52	.57 - .67
KAJ XAA	115/1/60	10.0	43.9	FRN-17½	20	3.35	.64
KAM IAH	208/1/60	6.1	34.1	FRN-12	15	5.41	2.17
IAB	230/1/60	6.0	30.4	FRN-9	15	5.63	2.47
XAB	230/1/60	5.6	23.2	FRN-9	15	13.84	2.58
TAC	208-230/3/60	2.7	19.9	FRN-5	15		4.55
CAF	115/1/5	10.5	54.0	FRN-17½	20	2.04	.74
CAG	230/1/50	4.6	27.7	FRN-9	15	6.41	2.56

ELECTRICAL COMPONENTS
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model		Run Capacitor MFD/V	Start Capacitor MFD/V	Relay	Protector
HAF -0025-	IAA		243-270/110	040-0004-03	071-0092-01
HAJ	SAA			040-0004-03	071-0092-01
HAK	IAB		61-72/320	040-0004-09	071-0092-03
	IAF		485-540/110	040-0004-03	071-0092-01
	IAG		124-149/220	040-0004-09	071-0092-24
HAF -0033-	IAA		324-360/110	040-0001-01	071-0092-04
HAJ	XAA		88-106/110	040-0004-10	071-0092-02
HAK	IAB		41-53/220	040-0001-26	071-0092-31
HAT	CAF	11/330	485-540/110	040-0004-03	071-0092-01
	CAG	5/330	124-149/220	040-0004-09	071-0092-24
HAF -0050-	IAA		400-450/110	040-0001-01	071-0092-35
HAJ	IAB		88-108/220	040-0001-03	071-0092-05
HAK					
HAT					
KAE -0050-	IAA		400-450/110	040-0001-01	071-0092-06
KAG	IAH		88-108/220	040-0001-03	071-0092-05
KAH	IAB		88-108/220	040-0001-03	071-0092-05
KAM	TAC				071-0090-06
KAN	CAF	11/330	590-708/110	040-0001-23	071-0092-17
	CAG	5/330	161-193/220	040-0001-30	071-0092-19
KAA -0075-	CAA	15/370	108-130/125	040-0001-11	071-0092-20
KAG	IAA		540-648/110	040-0001-01	071-0099-00
KAJ	XAA		243-270/110	040-0001-22	071-0092-10
KAM	IAH		145-175/220	040-0001-03	071-0092-27
	IAB		145-175/220	040-0001-03	071-0092-27
	XAB		53-64/220	040-0001-24	071-0092-15
	TAC				071-0090-05
	CAF	11/330	590-708/110	040-0001-23	071-0099-00
	CAG	7.5/330	161-193/220	040-0001-30	071-0092-27

ELECTRICAL DATA
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
KAJ -0100- CAA	115/1/60	12.4	85.5	FRN-20	30	2.26	.45
KAK CAH	208/1/60	7.3	36.4	FRN-12	15	4.73	1.94
KAL CAB	230/1/60	5.5	33.5	FRN-9	15	5.08	2.34
KAT TAC	208-230/3/60	3.9	25.0	FRN-7	15		4.10
TAD	460/3/60	2.1	15.0	FRS-3½	15		12.85
CAG	230/1/50	6.0	33.0	FRN-9	15	5.24	2.41
KAL -0150- CAH	208/1/60	8.1	45.0	FRN-12	15	4.16	1.39
KAT CAB	230/1/60	7.5	44.0	FRN-10	15	4.20	1.72
TAC	208-230/3/60	5.4	35.5	FRN-10	15		2.38
TAD	460/3/60	2.9	18.2	FRS-4	15		9.44
CAS	220/1/60	6.1	39.6	FRN-10	15	8.84	1.46
EAA -0150- CAH	208/1/60	6.4	44.0	FRN-12	15	4.20 - 4.60	1.02 - 1.35
EAB CAB	230/1/60	7.1	41.0	FRN-10	15	4.16 - 4.72	1.24 - 1.70
EAC TAC	208-230/3/60	6.0	38.0	FRN-10	15		1.88 - 2.03
EAJ TAD	460/3/60	2.5	19.0	FRS-4	15		7.00 - 8.30
EAV TAE	575/3/60	2.2	14.3	FRS-2½	15		12.7
EAB -0200- CAH	208/1/60	12.4	57.2	FRN-25	30	3.01	0.73
EAC CAB	230/1/60	9.5	58.0	FRN-15	15	2.71 - 4.02	.87 - 1.08
EAD TAC	208-230/3/60	6.8	46.0	FRN-12	15		1.33 - 1.68
EAL TAD	460/3/60	3.7	23.0	FRS-7	15		4.97 - 7.16
EAV TAE	575/3/60	2.3	20.0	FRS-4	15		8.92 - 9.81
3AH CAS	220/1/50	8.4	54.0	FRN-15	15	4.02	.87
3AJ							

ELECTRICAL COMPONENTS
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model		Run Capacitor MFD/V	Start Capacitor MFD/V	Relay	Protector	
KAJ -0100-	CAA	40/250	430-516/125	040-0001-11	071-0092-23	
KAK	CAH	10/370	145-175/220	040-0001-09	071-0092-14	
KAL	CAB	10/370	145-175/220	040-0001-04	071-0092-25	
KAT	TAC				071-0090-04	
	TAD				071-0090-07	
	CAG	10/370	108-130/250	040-0001-31	071-0092-21	
KAL -0150-	CAH	20/440	108-120/320	040-0001-05	071-0092-18	
KAT	CAB	20/440	108-120/320	040-0001-00	071-0092-18	071-0092-16 (KAL)
	TAC				071-0090-03	
	TAD				071-0090-27	
	CAS	20/440	108-120/320	040-0001-31	071-0092-16	
EAA -0150-	CAH	20/440	108-120/320	040-0001-05	071-0092-16	071-0092-18 (EAA)
EAB	CAB	20/440	108-120/320	040-0001-00	071-0092-16	071-0092-18 (EAA)
EAC	TAC				071-0090-03	
EAJ	TAD				071-0090-12	
EAV	TAE				071-0090-21	
EAB -0200-	CAH	25/440	135-155/320	040-0001-00	071-0092-18	071-0089-00 (3AH)
EAC	CAB	25/440	135-155/320	040-0001-00	071-0092-18	071-0099-01 (EAV)
EAD	TAC				071-0090-00	
EAL	TAD				071-0090-08	
EAV	TAE				071-0090-15	
3AH	CAS	25/440	135-155/320	040-0001-10	071-0092-18	
3AJ						

ELECTRICAL DATA
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
3AB -0310- CAB	230/1/60	15.4	86.0	FRN-25	35	1.84 - 2.54	.57 .61
LAC TAC	208-230/3/60	10.9	82.0	FRN-20	25		.66 - 1.05
LAH TAD	460/3/60	6.4	41.0	FRN-10	15		3.22 - 3.80
LAL TAE	575/3/60	3.4	30.0	FRS-7	15		5.25
LAM CAS	220/1/50	14.0	79.0	FRN-20	30	2.54	.61

*Fusetron recommended - Standard quick trip fuse might blow in event of locked rotor

ELECTRICAL COMPONENTS
COPELAMETIC AIR-COOLED COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor MFD/V	Relay	Protector	
3AB -0310- CAB	30/440	176-216/320	040-0001-08	071-0019-01	
LAC TAC				071-0090-01	071-0090-18 (LAL) (TAC)
LAH TAD				071-0090-03	071-0090-19 (LAH) (TAC)
LAL TAE				071-0090-14	071-0090-13 (LAM) (TAE)
LAM CAS	35/440	270-310/320	040-0001-10	071-0119-03	

ELECTRICAL DATA
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model		Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
			Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
ERA -0200-	CAH	208/1/60	13.4	57.2	FRN-20	30	3.01	0.73
ERC	CAB	230/1/60	10.4	58.0	FRN-15	15	2.71 - 3.68	1.06 - 1.08
ERJ	TAC	208-230/3/60	6.8	46.0	FRN-12	15		1.55 - 1.68
	TAD	460/3/60	3.6	23.0	FRS-5	15		4.97 - 7.16
	TAE	575/3/60	3.5	20.0	FRS-5	15		8.92 - 9.81
ERF -0310-	CAB	230/1/60	19.6	86.0	FRN-25	30	1.84 - 2.54	.57 - .61
3RA	TAC	208-230/3/60	13.1	82.0	FRN-20	25		.71 - .94
3RK	TAD	460/3/60	6.6	41.0	FRS-12	15		3.22 - 3.80
	TAE	575/3/60	4.6	30.0	FRS-7	15		5.25
NRB -0310-	CFB	230/1/60	21.1	84.0	FRN-35	40	2.54	.61
NRD	TFC	208-230/3/60	14.3	82.0	FRN-20	30		.70 - .94
NRN	TFD	460/3/60	7.3	41.0	FRS-15	20		3.53 - 4.07
	TFE	575/3/60	5.3	30.3	FRS-12	15		5.25
NRB -0400-	CFB	230/1/60	32.9	131.0	FRN-50	70	1.20	.38
	TFC	208-230/3/60	21.8	141.0	FRN-35	50		.47 - .56
	TFD	460/3/60	11.3	62.5	FRS-17½	25		2.16
NRA -0500-	CFB	230/1/60	36.5	131.0	FRN-50	70	1.20	.38
NRM	TFC	208-230/3/60	24.3	141.0	FRN-35	50		.47 - .56
NRL	TFD	460/3/60	12.1	62.5	FRS-17½	25		2.16
	TFE	575/3/60	9.2	53.4	FRS-15	20		3.27

*Fusetron recommended - standard quick trip fuse might blow in event of locked rotor

ELECTRICAL COMPONENTS
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor MFD/V	Relay	Protector	
ERA -0200- CAH ERC CAB ERJ TAC TAD TAE	25/440 25/440	135-155/320 135-155/320	040-0001-00 040-0001-00	071-0099-02 071-0103-02 071-0090-00 071-0090-08 071-0090-15	071-0099-01 (ERC)
ERF -0310- CAB 3RA TAC 3RK TAD TAE	40/440	135-155/320	040-0001-08	071-0119-00 071-0090-02 071-0090-10 071-0090-16	071-0119-02 (3RA) 071-0090-17 (3RA) 071-0090-22 (3RA) 071-0090-03 (3RK)
NRB -0310- CFB NRD TFC NRN TFD TFE	30/440	176-216/320 216-240/320) (NRN)	040-0001-08	071-0128-00 071-0086-11 071-0086-37 071-0086-31	
NRB -0400- CFB TFC TFD	25/440	176-216/320	040-0001-05	071-0087-01 071-0086-39 071-0086-14	
NRA -0500- CFB NRM TFC NRL TFD TFE	70/440	216-240/320	040-0001-00	071-0087-01 071-0086-39 071-0086-14 071-0086-17	

ELECTRICAL DATA
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps				Fuse Size		Winding Resistance in Ohms
		Full Winding		1/2 Winding		Recommended Max		
		Rated Load	Locked Rotor	Rated Load	Locked Rotor	Fusetron	*Std.	
9RA -0500- CFB	230/1/60	27.5	125.0			FRN-40	50	Start 1.5 Run .40
9RB TFC	208-230/3/60	22.0	115.0			FRN-25	40	.51- .61
9RJ TFD	460/3/60	12.1	53.0			FRS-15	15	2.22-2.78
9TK TFE	575/3/60	7.8	42.0			FRS-10	15	3.40-3.96
MRA FSR	200-240/3/50	17.0	90.0	8.5	58.0	FRN-25	35	.58- .69
MRB FSM	380-420/3/50	9.5	50.0	4.8	32.5	FRS-15	20	1.80-2.15
MRF								
9RA -0760- TFC	208-230/3/60	32.8	164.0			FRN-60	70	.32- .38
9RB TFD	460/3/60	15.9	82.0			FRS-25	30	1.35-1.41
9RC TFE	575/3/60	14.0	63.8			FRS-20	30	2.03-2.34
9RS FSR	200-240/3/50	32.5	130.0	16.3	85.0	FRN-50	70	.38- .44
9TL FSM	380-420/3/50	18.8	75.0	9.4	49.0	FRS-25	40	1.24-1.46
MRH								
4RA -0750- TSK	208-230/3/60	27.6	172.0	13.8	99.0	FRN-40	50	.68- .70
TSK	460/3/60	13.8	86.0			FRS-17½	25	1.35-1.40
TSE	575/3/60	11.9	65.0			FRS-17½	25	2.19
FSR	200-240/3/50	22.0	105.0	11.0	69.0	FRN-40	50	.38- .43
FSM	380-420/3/50	12.5	61.0	6.25	40.0	FRS-20	25	1.26-1.46
9RC -1010- THC	208-230/3/60	44.8	208.0			FRN-80	100	.23
9RS THD	460/3/60	22.1	104.0			FRS-40	50	.92- .95
9TH THE	575/3/60	18.0	88.2			FRS-30	40	1.46-1.49
9RP FSR	200-240/3/50	36.2	222.0	18.1	144.0	FRN-80	80	.27- .31
FSM	380-420/3/50	20.4	125.0	10.2	81.0	FRS-35	40	.86- .98

* Fusetron recommended - standard quick trip fuse might blow in event of locked rotor.

ELECTRICAL COMPONENTS
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor MFD/V	Relay	Protector	
9RA -0500- CFB	60/440	216-240/320	040-0001-12	071-0087-04	
9RB TFC	50/440			071-0086-38	071-0086-09 (9RA,B,J)
9RJ TFD	(9RB, 9RT)			071-0086-17	
9TK TFE				071-0086-29	
MRA FSR				071-0398-00	071-0398-01 (120V)
MRB FSM				071-0398-00	071-0398-01 (120V)
MRF					
9RA -0760- TFC				071-0086-22	071-0086-21 (MR,9RA,J)
9RB TFD				071-0086-20	071-0086-23 (9RS)(TFC)
9RC TFE				071-0086-18	071-0086-26 (9RS)
9RS FSR				071-0398-00	071-0398-01 (120V)
9TL FSM				071-0398-00	071-0398-01 (120V)
MRH					
4RA -0750- TSK				071-0376-01	071-0376-02 (120V)
TSE				071-0376-01	071-0376-02 (120V)
FSR				071-0398-00	071-0398-01 (120V)
FSM				071-0398-00	071-0398-01 (120V)
9RC -1010- THC				071-0338-01	
9RS THD				071-0339-02	
9TH THE				071-0339-03	
9RP FSR				071-0398-00	071-0398-01 (120V)
FSM				071-0398-00	071-0398-01 (120V)

ELECTRICAL DATA
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps				Fuse Size		Winding Resistance in Ohms
		Full Winding		1/2 Winding		Recommended Max		
		Rated Load	Locked Rotor	Rated Load	Locked Rotor	Fusetron	*Std.	
4RA -1000- TSK	208-230/3/60	54.8	240	27.4	140	FRN-70	100	.44- .52
4RE TSK	460/3/60	27.4	120			FRS-35	50	.89-1.04
6RA TSE	575/3/60	19.8	106			FRS-35	40	1.44
6RB FSR	200-240/3/50	39.2	176	19.6	115	FRN-60	90	.63- .73
FSM	380-420/3/50	22.0	102	11.0	63	FRS-35	50	1.90-2.18
9RS -1500- THC	208-230/3/60	62.0	284			FRN-100	150	.15- .21
9RT THD	460/3/60	29.8	144			FRS-50	70	.56- .81
THE	575/3/60	28.0	127			FRS-45	60	.88
FSR	200-240/3/50	53.0	195	26.5	127	FRS-90	100	.41- .46
FSM	380-420/3/50	30.0	110	15.0	72	FRS-50	60	1.23-1.41
4RH -1500- TSK	208-230/3/60	63.0	278	31.5	170	FRN-90	125	.37- .41
4RL TSK	460/3/60	31.5	139			FSR-50	60	.74- .82
4RK FSR	200-240/3/50	48.0	200	24.0	124	FRN-70	100	.48- .55
FSM	380-420/3/50	27.0	120	13.5	76	FRS-45	60	1.51-1.73
4RA -2000- TSK	208-230/3/60	71.4	308	35.7	188	FRN-100	150	.32- .35
4RE TSK	460/3/60	35.7	154			FRS-50	70	.65- .69
6RA TSE	575/3/60	29.5	135	14.8	74	FRS-50	60	2.10
6RE FSR	200-240/3/50	57.5	211	28.8	137	FRN-90	125	.47- .54
6RB FSD	380-420/3/50	34.0	135	17.0	82	FRS-50	70	.70- .81
6RN FSD	460/3/60	32.3	135	16.2	82	FRS-50	70	.70- .81
6RH -2000- TSK	208-230/3/60	72.00	308	36.0	188	FRN-100	175	.34
6RK TSK	460/3/60	36.0	154			FRS-70	90	.67
6RP TSE	575/3/60	29.5	135	14.8	74	FRS-50	60	2.10
6TM FSR	200-240/3/50	57.5	211	28.8	137	FRN-90	125	.47- .54
4RJ FSM	380-420/3/50	34.0	125	17.0	82	FRS-50	70	1.41-1.62

* Fusetron recommended - standard quick trip fuse might blow in event of locked rotor.

ELECTRICAL COMPONENTS
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Protector	
	Standard or 240V	120V
4RA -1000- TSK	071-0376-01	071-0376-02
4RE TSE	071-0376-01	071-0376-02
6RA FSR	071-0398-00	071-0398-01
6RB FSM	071-0398-00	071-0398-01
9RS -1500- THC	071-0337-00	
9RT THD	071-0338-04	
THE	071-0339-13	
FSR	071-0398-00	071-0398-01
FSM	071-0398-00	071-0398-01
4RH -1500- TSK	071-0376-01	071-0376-02
4RL FSR	071-0398-00	071-0398-01
4RK FSM	071-0398-00	071-0398-01
4RA -2000- TSK	071-0376-01	071-0376-02
4RE TSE	071-0376-01	071-0376-02
6RA FSR	071-0398-00	071-0398-01
6RE FSD	071-0398-00	071-0398-01
6RB		
6RN		
6RH -2000- TSK	071-0376-01	071-0376-02
6RK TSE	071-0376-01	071-0376-02
6RP FSR	071-0398-00	071-0398-01
6TM FSM	071-0398-00	071-0398-01
4RJ		

ELECTRICAL DATA
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model	Voltage	Motor Amps				Fuse Size		Winding Resistance in Ohms
		Full Winding		1/2 Winding		Recommended Max		
		Rated Load	Locked Rotor	Rated Load	Locked Rotor	Fusetron	*Std.	
4RH -2500- TSK	208-230/3/60	96.9	428	48.5	250	FRN-125	200	.24- .28
4RK TSK	460/3/60	48.5	214			FRS-70	100	.48- .56
6RL TSE	575/3/60	36.0	160	18.0	113	FRS-50	80	1.53-1.76
FSR	200-240/3/50	73.0	290	36.5	180	FRN-100	150	.36- .42
FSD	380-420/3/50	38.0	165	19.0	100	FRS-50	80	1.07-1.23
FSD	460/3/60	45.0	165	22.5	100	FRS-50	80	1.07-1.23
6RA -3000- TSK	208-230/3/60	105.0	470	52.5	292	FRN-175	250	.21- .23
6RE TSK	460/3/60	52.5	235			FRS-90	125	.43- .46
6RN TSE	575/3/60	50.0	200	25.0	130	FRS-70	110	1.36
4RJ FSR	200-240/3/50	96.0	351	48.0	238	FRN-125	200	.30- .34
4RR FSD	380-420/3/50	57.0	200	28.5	121	FRS-90	125	.93-1.07
6RT FSD	460/3/60	50.6	200	25.3	121	FRS-90	125	.93-1.07
6RH -3500- TSK	208-230/3/60	135.0	565	67.5	340	FRN-175	300	.16- .20
6RK TSK	460/3/60	67.5	283			FRS-90	150	.32- .40
6RP TSE	575/3/60	58.0	230	29.0	172	FRS-75	125	.99-1.13
FSR	200-240/3/50	115.0	394	57.5	256	FRN-150	250	.25- .28
FSD	380-420/3/50	65.0	225	32.5	150	FRS-90	140	.74- .86
FSD	460/3/60	67.5	225	38.8	150	FRS-90	140	.74- .86
6RJ -4000- TSN	230/3/60	142.0	594	71.0	340	FRN-200	300	.16- .20
6RR TSN	460/3/60	71.0	297			FRS-100	150	.32- .40
6RS FSU	200/3/60	170.0	625	85.0	388	FRN-200	350	.06- .07
TSE	575/3/60	60.0	225	30.0	125	FRS-75	125	1.10-1.26
FSR	200-240/3/50	140.0	425	70.0	261	FRN-200	300	.12- .14
FSD	380-420/3/50	65.0	225	32.5	150	FRS-100	150	.74- .86
FSD	460/3/60	64.3	225	32.2	150	FRS-100	150	.74- .86

* Fusetron recommended - standard quick trip fuse might blow in event of locked rotor.

ELECTRICAL DATA
COPELAMETIC REFRIGERANT-COOLED COMPRESSORS

Compressor Model		Protector	
		240V	120V
4RH -2500-	TSK	071-0398-00	071-0398-01
4RK	TSE	071-0398-00	071-0398-01
6RL	FSR	071-0398-00	071-0398-01
	FSD	071-0398-00	071-0398-01
6RA -3000-	TSK	071-0376-01	071-0376-02
6RE	TSE	071-0376-01	071-0376-02
6RN	FSR	071-0398-00	071-0398-01
4RJ	FSD	071-0398-00	071-0398-01
4RR			
6RT			
6RH -3500-	TSK	071-0398-00	071-0398-01
6RK	TSE	071-0398-00	071-0398-01
6RP	FSR	071-0398-00	071-0398-01
	FSD	071-0398-00	071-0398-01
6RJ -4000-	TSN	071-0398-00	071-0398-01
6RR	FSU	071-0398-00	071-0398-01
6RS	TSE	071-0398-00	071-0398-01
	FSR	071-0398-00	071-0398-01
	FSD	071-0398-00	071-0398-01

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
JFC -0025- IAA	115/1/60	4.6	25.5	FRN-9	15	5.38 - 9.18	1.59 - 1.99
JRN SAA	115/1/60	4.6	26.3	FRN-9	15	15.8 -16.2	1.71 - 1.86
JFB -0033- IAA	115/1/60	5.2	27.7	FRN-12	15	2.80 - 3.22	1.18 - 1.36
SAA	115/1/60	5.2	35.5	FRN-12	15	10.4	1.27
IAH	208/1/60	2.7	15.0	FRN-6	15	11.92 -13.72	5.10 - 5.86
JFH -0033- IAA	115/1/60	7.8	42.0	FRN-15	15	5.74 - 6.60	.87 - 1.0
JRE SAA	115/1/60	8.1	46.1	FRN-15	15	7.77 - 9.50	.86 - 1.11
IAG	230/1/50	3.2	17.6	FRN-6	15	34.92 -38.52	4.46 - 4.92
JFP -0050- IAA	115/1/60	9.7	48.0	FRN-20	20	4.39 - 5.05	.67 - .77
JRL IAV	208-230/1/60	4.6	23.5	FRN-8	15	19.62 -22.58	2.77 - 3.19
JRE -0050- PAA	115/1/60	7.4	30.5	FRN-12	15	12.76	1.29
JRC -0050- PAA	115/1/60	7.6	30.5	FRN-12	15	12.56 -14.45	1.48 - 1.70
JRS -0050- PAA	115/1/60	5.4	29.4	FRN-12	15	9.53 -10.97	1.13 - 1.29
JRC -0075- PAA	115/1/60	8.5	34.4	FRN-12	15	9.21 -11.13	.93 - 1.13
JRE -0075- PAA	115/1/60	8.1	34.4	FRN-12	15	9.67 -11.13	.99 - 1.13
PAV	208-230/1/60	4.0	16.6	FRN-8	15	10.93 -12.57	3.79 - 4.35
PAJ	265/1/60	3.4	17.1	FRN-8	15	8.50	5.80
PAZ	220-240/1/50	3.7	15.0	FRN-7	15	8.50	5.80

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor Supplementary MFD/V	Start Capacitor High Torque MFD/V	Relay	Protector
JFC -0025- IAA			233-280/110	040-0090-00	071-0369-11
JRN SAA				040-0089-04	071-0369-11
JFB -0033- IAA			233-280/110	040-0090-01	071-0369-16
SAA				040-0089-07	071-0369-16
IAH			61-72/250	040-0090-05	071-0369-19
JFH -0033- IAA			233-280/110	040-0090-03	071-0369-15
JRE SAA				040-0089-06	071-0369-15
IAG			61-72/250	040-0090-05	071-0369-20
JFP -0050- IAA			233-280/110	040-0090-04	071-0369-18
JRL IAV			41-53/220	040-0090-00	071-0369-17
JRE -0050- PAA	15/370	41-53/220		040-0001-26	071-0370-13
JRC -0050- PAA	15/370	41-53/220		040-0001-26	071-0370-09
JRS -0050- PAA	15/330	41-53/220		040-0001-26	071-0370-23
JRC -0075- PAA	15/370	41-53/220		040-0001-26	071-0370-12
JRE -0075- PAA	15/370	41-53/220		040-0001-26	071-0370-12
PAV	10/370	41-53/220		040-0001-26	071-0370-16
PAJ	12½/370	41-53/220		040-0001-26	071-0370-24
PAZ	15/370	41-53/250		040-0001-26	071-0370-24

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
JRF -0075- PAA	115/1/60	9.4	46.0	FRN-20	25	8.87 -10.21	.83 - .95
PAV	208-230/1/60	4.5	23.8	FRN-9	15	8.33 - 9.59	2.54 - 2.92
PAJ	265/1/60	4.0	22.2	FRN-8	15	6.72	4.0
PAZ	220-240/1/50	3.5	20.0	FRN-7	15	6.72	4.0
PAI	208-230/1/50	4.6	20.0	FRN-8	15	9.23 -10.61	3.16 - 3.64
JRJ -0075- PAA	115/1/60	7.9	36.5	FRN-20	20	11.63 -13.38	.99 - 1.13
JRG -0100- PAA	115/1/60	10.6	50.0	FRN-20	25	9.24 -12.41	.65 - .80
PAV	208-230/1/60	5.9	25.0	FRN-9	15	7.35 - 8.45	2.19 - 2.51
JRL -0100- PAA	115/1/60	10.9	50.0	FRN-20	30	5.95 - 6.85	.54 - .63
PAV	208-230/1/60	5.6	29.3	FRN-15	15	7.44	2.0
PAG	230/1/50	5.2	22.0	FRN-9	15	8.28 - 9.52	2.70 - 3.10

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
JRF -0075- PAA	15/370	41-53/220		040-0001-26	071-0370-14
PAV	12½/370	41-53/220		040-0001-26	071-0370-17
PAJ	15/370				071-0370-22
PAZ	15/370				071-0370-22
PAI	15/370	41-53/220			071-0370-16
JRJ -0075- PAA	15/370	41-53/220		040-0001-26	071-0370-07
JRG -0100- PAA	15/370	41-53/220		040-0001-26	071-0370-06
PAV	12½/370	41-53/220		040-0001-26	071-0370-19
JRL -0100- PAA	25/370	41-53/250		040-0001-26	071-0370-06
PFV	20/370	41-53/220		040-0001-26	
PAG	15/370	41-53/220		040-0001-27	071-0370-15

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
JRH -0100- PAA	115/1/60	11.1	50.0	FRN-20	25	6.76 - 9.30	.68 - .84
PAV	208-230/1/60	5.4	25.0	FRN-12	15	7.35 - 8.45	2.19 - 2.51
PAJ	265/1/60	4.9	27.4	FRN-12	15	6.17	3.0
PAZ	220-240/1/50	5.7	24.8	FRN-10	15	6.17	3.0
PAG	230/1/50	5.2	22.0	FRN-9	15	8.28 - 9.52	2.70 - 3.10
JRR -0100- PFA	115/1/60	12.8	59.5	FRN-20	35	5.21 - 5.99	.44 - .51
PAV	208-230/1/60	6.8	34.0	FRN-15	15	8.42 - 9.68	1.63 - 1.87
PFV	208-230/1/60	7.1	34.0	FRN-15	15	8.42 - 9.68	1.63 - 1.87
PAJ	265/1/60	5.6	33.0	FRN-12	15	7.81 - 8.99	2.09 - 2.41
PAZ	220-240/1/50	6.8	31.0	FRN-12	15	7.81 - 8.99	2.09 - 2.41
RSF -0050- IAA	115/1/60	8.8	51.0	FRN-17½	25	3.35 - 4.46	.51 - .69
RSN IAV	208-230/1/60	4.6	24.1	FRN-8	15	13.21 -16.35	2.01 - 2.35
RSH IAF	115/1/50	10.0	52.0	FRN-15	20	5.67 - 6.53	.58 - .67
IAG	230/1/50	5.2	26.0	FRN-8	15	22.69 -26.11	2.33 - 2.68
RRS -0075- IAA	115/1/60	13.3	66.3	FRN-20	30	2.14 - 2.61	.40 - .47
IAV	208-230/1/60	6.5	33.5	FRN-12	15	7.72 - 8.88	1.41 - 1.63
RSN -0075- IAA	115/1/60	14.9	66.3	FRN-20	30	2.14 - 2.61	.40 - .47
PAA	115/1/60	10.3	50.0	FRN-20	25	4.24 - 4.88	.54 - .63
CAA	115/1/60	14.9	66.3	FRN-20	30	2.14 - 2.61	.40 - .47
CAV	208-230/1/60	6.9	37.0	FRN-15	15	7.72 - 8.88	1.41 - 1.63
IAV	208-230/1/60	8.8	45.0	FRN-20	20	6.58 - 7.56	1.37 - 1.57
PAI	208-230/1/50	6.0	21.5	FRN-10	15	12.37 -14.23	2.47 - 2.85
PAG	230/1/50	6.0	21.5	FRN-10	15	12.37 -14.23	2.47 - 2.85
PAF	115/1/50	14.5	61.0	FRN-20	30	8.65	.56
REA -0075- PAA	115/1/60	9.1	36.7	FRN-17½	20	4.98 - 6.96	.65 - .83

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
JRH -0100- PAA	20/370	41-53/250		040-0001-26	071-0370-06
PAV	15/370	41-53/220		040-0001-26	071-0370-19
PAJ	15/370	41-53/320		040-0001-26	071-0370-17
PAZ	15/330	41-53/320		040-0001-26	071-0370-17
PAG	15/370	41-53/220		040-0001-27	071-0370-15
JRR -0100- PFA	25/330	43-53/320		040-0001-20	
PAV	15/370	41-53/250		040-0001-26	071-0370-20
PFV	15/370	41-53/250		040-0001-26	
PAJ	15/440				0/1-0370-21
PAZ	15/370	41-53/220		040-0001-27	071-0370-21
RSF -0050- IAA			189-210/220	040-0088-00	071-0127-34
RSN IAV			41-53/320	040-0088-03	071-0329-11 (RSN)
RSH					071-0329-10
IAF			145-175/220	040-0088-00	071-0127-04
IAG			41-53/220	040-0088-02	071-0127-22
RRS -0075- IAA			189-210/220	040-0088-04	071-0127-18
IAV		41-53/220	61-72/250	040-0088-05	071-0329-07
RSN -0075- IAA		124-149/220	282-340/160	040-0088-04	071-0127-30
PAA	25/370	41-53/220		040-0001-26	071-0127-19
CAA	10/370		282-340/160	040-0088-04	071-0127-30
CAV	15/370		88-108/220	040-0001-19	071-0329-16
IAV			88-108/220	040-0088-05	071-0127-05
PAI	15/370		41-53/220	040-0088-01	071-0329-13
PAG	15/370		41-53/250	040-0088-01	071-0329-18
PAF	20/370	41-53/220	88-108/220	040-0001-27	071-0127-06
REA -0075- PAA	25/330	41-53/220		040-0001-26	071-0329-02

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
RRL -0075- CAG	230/1/50	6.3	28.9	FRN-10	15	8.28 - 9.52	1.88 - 2.16
CAF	115/1/50	12.6	61.0	FRN-20	25	8.65	.56
RSL -0075- IAA	115/1/60	11.8	66.3	FRN-20	30	2.14 - 2.61	.40 - .47
CAA	115/1/60	11.8	66.3	FRN-20	30	2.14 - 2.61	.40 - .47
IAV	208-230/1/60	6.8	33.5	FRN-10	15	7.72 - 8.88	141 - 1.63

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
RRL -0075- CAG	15/370		41-53/220	040-0001-27	071-0329-13
CAF	20/370		88-108/220	040-0001-27	071-0127-33
RSL -0075- IAA	10/370		282-340/160	040-0088-04	071-0127-06
CAA			282-340/160	040-0088-04	071-0127-06
IAV			61-72/250	040-0088-05	071-0329-04

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
RRF -0100- PAA RRW	115/1/60	11.4	48.0	FRN-20	25	6.18 - 7.48	.55 - .67
RRG -0100- PAV	208-230/1/60	6.0	33.5	FRN-12	15	7.72 - 8.88	1.41 - 1.63
PAG	230/1/50	6.25	30.3	FRN-10	15	11.63 -13.38	1.81 - 2.09
RRL -0100- CAA	115/1/60	12.1	77.0	FRN-20	30	6.17 - 7.09	.37 - .42
CAV	208-230/1/60	7.3	40.0	FRN-12	15	5.59 - 6.43	1.46 - 1.68
REW -0100- PAA	115/1/60	11.7	50.0	FRN-20	30	3.07 - 4.01	.52 - .62
RSL -0100- CAA	115/1/60	18.0	78.0	FRN-30	45	4.49 - 5.17	.35 - .41
CAV	208-230/1/60	10.4	51.0	FRN-20	25	4.48 - 5.16	1.01 - 1.17
RRH -0100- PAG	230/1/50	7.6	30.5	FRN-12	15	8.17 - 9.56	1.81 - 2.21
RSH PAI	208-230/1/50	7.6	30.5	FRN-12	15	8.17 - 9.56	1.81 - 2.21
RRK -0125- PAA	115/1/60	13.6	72.5	FRN-25	35	4.49 - 5.84	.35 - .43
PAV	208-230/1/60	7.4	40.0	FRN-12	15	4.0 - 8.67	1.40 - 1.74
RRH -0150- PFV	208-230/1/60	9.4	40.9	FRN-15	20	5.58	1.50
PAV	208-230/1/60	8.8	42.0	FRN-15	20	4.0 - 6.08	1.36 - 1.67
PAH	208/1/60	8.4	43.0	FRN-15	20	4.42 - 5.08	1.26 - 1.44
PAJ	265/1/60	7.1	41.0	FRN-15	15	7.17 - 8.25	1.57 - 1.81
PAZ	220-240/1/50	8.4	37.3	FRN-15	15	7.17 - 8.25	1.57 - 1.81
PAG	230/1/50	7.6	30.5	FRN-12	15	8.17 - 9.56	1.81 - 2.21
PAI	208-230/1/50	7.6	30.5	FRN-12	15	8.17 - 9.56	1.81 - 2.21
RRJ -0150- PAI RRL	208-230/1/50	10.0	42.5	FRN-15	20	4.60 - 5.30	1.30 - 1.50

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
RRF -0100- PAA	25/370	61-72/250	88-108/220	040-0001-26	071-0329-01 (RRF)
RRW					071-0329-09 (RRW)
RRG -0100- PAV	15/370	41-53/220	61-72/250	040-0001-26	071-0329-00
PAG	15/370	41-53/220		040-0001-27	071-0329-14
RRL -0100- CAA	15/370	41-53/220	88-108/220	040-0001-20	071-0127-29
CAV	15/370	41-53/220	108-120/220	040-0001-19	071-0127-05
REW -0100- PAA	35/330	61-72/250		040-0001-25	071-0329-19
RSL -0100- CAA	30/370		80-108/220	040-0001-20	071-0127-30
CAV	25/370	43-53/320	94-113/320	040-0001-26	071-0127-24
RRH -0100- PAG	20/370	61-72/250		040-0001-27	071-0127-14
RSH PAI	20/370	61-72/250		040-0001-27	071-0127-14
RRK -0125- PAA	30/370	61-72/320		040-0001-26	071-0127-18
PAV	17½/370	41-53/320	108-120/220	040-0001-19	071-0127-05
RRH -0150- PFV	25/370	81-90/320	108-120/220	040-0001-26	071-0340-06
PAV	25/370	81-90/320	108-120/220	040-0001-26	071-0329-02
PAH	25/370	81-90/320	108-120/220	040-0001-26	071-0329-02
PAJ	20/440				071-0127-36
PAZ	20/370				071-0127-36
PAG	20/370	61-72/250		040-0001-27	071-0127-14
PAI	20/370	61-72/250		040-0001-27	071-0127-14
RRJ -0150- PAI	25/370	41-53/220	61-72/250	040-0001-27	071-0127-20
RRL					

ELECTRICAL DATA
COPEAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
RRJ -0175- PFV	208-230/1/60	13.2	51.0	FRN-20	25	3.81 - 4.82	.89 - 1.16
RRL PAV	208-230/1/60	10.1	51.0	FRN-20	25	3.81 - 4.82	.89 - 1.16
RSL PFH	208/1/60	11.3	60.0	FRN-20	25	3.77 - 4.71	.80 - .93
PFB	230/1/60	12.2	51.0	FRN-20	25	5.60 - 5.95	1.05 - 1.14
PAJ	265/1/60	9.1	46.0	FRN-15	20	4.09 - 4.71	1.28 - 1.48
PAH	208/1/60	11.3	55.0	FRN-25	30	5.90	.90
TFC	208-230/3/60	7.4	45.0	FRN-15	15		1.90 - 2.18
PAI	208-230/1/50	10.8	45.0	FRN-15	20	5.10 - 5.87	1.13 - 1.29
PAZ	220-240/1/50	10.8	41.0	FRN-15	20	4.09 - 4.71	1.28 - 1.48
RRY -0175- PAV	208-230/1/60	10.1	47.0	FRN-20	25	4.89 - 5.63	1.17 - 1.35
PAJ	265/1/60	9.1	46.0	FRN-15	20	4.09 - 4.71	1.28 - 1.48
PAZ	220-240/1/50	10.8	41.0	FRN-15	20	4.09 - 4.71	1.28 - 1.48
REY -0175- PAV	208-230/1/60	9.4	53.2	FRN-15	20	3.40 - 3.92	1.03 - 1.19
SSC -0100- CAV	208-230/1/60	6.6	45.0	FRN-12	15	4.02 - 6.57	1.40 - 1.65
CAA	115/1/60	12.4	80.0	FRN-25	35	4.49 - 5.17	.35 - .41
SSE -0100- CAB	230/1/60	7.5	45.0	FRN-12	15	5.71 - 6.57	1.43 - 1.66
CAH	208/1/60	7.8	48.0	FRN-15	15	6.27 - 7.21	1.27 - 1.47
TFC	208-230/3/60	4.1	34.0	FRN-15	15		2.33 - 2.69
TFR	208-220/3/50	5.3	37.0	FRN-10	15		2.51
CAG	230/1/50	8.0	40.0	FRN-12	15	8.43 - 9.69	1.38 - 1.58
SRJ -0150- CAB	230/1/60	11.2	44.0	FRN-15	20	5.74	1.46
CFB	230/1/60	8.2	44.0	FRN-15	20	5.34 - 6.14	1.36 - 1.56
SRM -0150- TFR	208-220/3/50	6.5	37.0	FRN-10	15		2.51
CFG	230/1/50	11.2	45.0	FRN-15	20	5.49 - 6.31	1.01 - 1.17

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
RRJ -0175- PFV	25/370	41-53/220	61-72/250	040-0001-26	
RRL PAV	25/370	41-53/220	61-72/250	040-0001-26	071-0127-27
RSL PFH	25/370	41-53/320	61-72/320	040-0001-26	
PFB	25/370	41-53/220	61-72/250	040-0001-26	
PAJ	20/440	41-53/320		040-0001-20	071-0127-16
PAH	25/370	41-53/320	61-72/320	040-0001-26	071-0127-35
TFC					
PAI	30/370	41-53/250	61-72/250	040-0001-27	071-0127-24
PAZ	25/370	41-53/250	61-72/250	040-0001-27	071-0127-16
RRY -0175- PAV	25/370	41-53/250		040-0001-26	071-0127-17
PAJ	20/440	41-53/250		040-0001-20	071-0127-16
PAZ	20/370	41-53/250	61-72/250	040-0001-27	071-0127-16
REY -0175- PAV	35/330	41-53/320		040-0001-25	071-0127-37
SSC -0100- CAV	20/370	41-53/250	145-175/220	040-0001-19	071-0127-14
CAA	25/370	61-72/250	161-193/220	040-0001-26	071-0127-18
SSE -0100- CAB	20/370		145-175/220	040-0001-19	071-0127-28
CAH	15/370		145-175/220	040-0001-16	071-0329-02
TFC					
TFR					
CAG	15/370	88-108/220	145-175/220	040-0001-10	071-0127-13
SRJ -0150- CAB	30/370		94-113/320	040-0001-26	071-0127-17
CFB	30/370		94-113/320	040-0001-26	
SRM -0150- TFR					
CFG	25/370		94-113/320	040-0001-27	

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
SRB -0200- PFV	208-230/1/60	11.8	51.0	FRN-20	25	3.09 - 3.96	.89 - 1.10
PAV	208-230/1/60	10.9	51.0	FRN-20	25	3.09 - 3.96	.89 - 1.10
PFH	208/1/60	12.4	57.6	FRN-25	30	3.81 - 4.39	.76 - .88
PFB	230/1/60	11.6	51.0	FRN-20	25	4.42 - 5.08	1.01 - 1.17
PFJ	265/1/60	10.6	54.6	FRN-20	25	4.56 - 5.24	1.13 - 1.31
(5) PFV	208-230/1/60	12.5	60.0	FRN-25	30	4.20 - 5.67	.91 - 1.21
PAI	208-230/1/50	10.8	46.0	FRN-15	20	4.77 - 5.49	1.12 - 1.28
PFZ	220-240/1/50	12.0	49.5	FRN-20	25	4.56 - 5.24	1.13 - 1.31
PAG	230/1/50	9.9	45.0	FRN-20	20	5.10 - 5.87	1.13 - 1.29
SRC -0200- PFV	208-230/1/60	12.9	61.0	FRN-25	35	3.16 - 3.64	.85 - .97
PFB	230/1/60	13.9	55.5	FRN-25	35	3.77 - 4.33	.86 - 1.0
(5) PFV	208-230/1/60	13.4	61.0	FRN-25	35	3.69 - 4.44	.96- 1.18
TFC	208-230/3/60	8.9	59.0	FRN-20	20		1.42 - 1.64
PAG	230/1/50	11.7	46.0	FRN-20	25	4.77 - 5.49	1.12 - 1.28
PFG	230/1/50	11.7	46.0	FRN-20	25	4.77 - 5.49	1.12 - 1.28
SRA -0200- PFV	208-230/1/60	12.0	51.0	FRN-20	25	4.28	1.07
(5) PFV	208-230/1/60	12.9	61.0	FRN-25	30	3.35 - 5.10	1.02 - 1.20
PAG	230/1/50	10.0	42.5	FRN-15	20	4.60 - 5.30	1.30 - 1.50
PFG	230/1/50	10.0	42.5	FRN-15	20	4.60 - 5.30	1.30 - 1.50
SRH -0200- PFB	230/1/60	14.4	61.0	FRN-25	35	2.90 - 3.45	.75 - .87
PFH	208/1/60	15.6	68.0	FRN-30	35	3.58 - 4.12	.61 - .70
SSC -0200- CFV	208-230/1/60	11.4	67.0	FRN-25	30	3.77 - 4.33	.82 - .94
SEC -0200- PFV	208-230/1/60	14.8	61.0	FRN-25	35	3.69 - 4.25	.96 - 1.10
SEB -0200- PFV	208-230/1/60	12.9	51.0	FRN-20	25	3.38 - 3.88	.95 - 1.10
SHC -0200- PFV	208-230/1/60	13.8	61.0	FRN-25	35	3.21 - 3.69	.88 - 1.02

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor Supplementary MFD/V	Start Capacitor High Torque MFD/V	Relay	Protector
SRB 0200- PFV	30/370	88-108/220	108-120/220	040-0001-26	
PAV	30/370	88-108/220	108-120/220	040-0001-26	071-0127-31
PFH	30/370	41-53/220	108-120/220	040-0001-26	
PFB	30/370	88-108/220	108-120/220	040-0001-26	
PFJ	25/440	41-53/250	108-120/320	040-0001-20	
(5) PFV	25/370	41-53/320		040-0001-20	
PAI	30/370	41-53/320	189-210/220	040-0001-14	071-0127-16
PFZ	35/370	41-53/250	108-120/320	040-0001-20	
PAG	30/370	41-53/220	88-108/220	040-0001-27	071-0127-32
SRC -0200- PFV	35/370	61-72/250	108-120/320	040-0001-26	
PFB	35/370	61-72/250	108-120/320	040-0001-26	
(5) PFV	35/370	41-53/320		040-0001-20	
TFC					
PAG	35/370	41-53/320	189-210/220	040-0001-14	071-0127-08
PFG	35/370	41-53/320	189-210/220	040-0001-14	
SRA -0200- PFV	25/370	41-53/220	61-72/250	040-0001-26	
(5) PFV	25/370	41-53/320		040-0001-20	
PAG	25/370	41-53/220	108-120/220	040-0001-27	071-0127-20
PFG	25/370	41-53/220	108-120/220	040-0001-27	
SRH -0200- PFB	35/370	41-53/320	145-175/250	040-0001-26	
PFH	35/370	41-53/320		040-0001-26	
SSC -0200- CFV	25/440		145-175/250	040-0001-19	
SEC -0200- PFV	35/370	41-53/320		040-0001-20	
SEB 0200- PFV	30/370	88-108/220		040-0001-26	
SHC -0200- PFV	35/370	61-72/250	108-120/320	040-0001-26	

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
SRD -0225- PFH	208/1/60	17.1	74.0	FRN-30	40	2.99 - 3.45	.59 - .67
PFV	208-230/1/60	14.6	74.0	FRN-25	35	2.70 - 3.94	.62 - .80
PFB	230/1/60	14.6	61.0	FRN-25	35	2.99 - 3.45	.75 - .86
PFJ	265/1/60	12.8	74.9	FRN-25	30	3.25 - 3.73	.78 - .90
TFC	208-230/3/60	8.4	59.0	FRN-15	20		1.53
PFZ	220-240/1/50	14.6	67.5	FRN-25	30	3.25 - 3.73	.78 - .90
PFG	230/1/50	13.3	59.7	FRN-25	30	3.28 - 3.78	.88 - 1.01
PFI	208-230/1/50	14.5	68.0	FRN-25	30	3.26 - 3.75	.77 - .89
PAG	230/1/50	13.3	59.7	FRN-25	30	3.28 - 3.78	.88 - 1.01
SRJ -0225- PFV	208-230/1/60	18.2	85.0	FRN-30	40	2.37 - 2.80	.59 - .72
PFB	230/1/60	15.8	85.0	FRN-30	40	2.36 - 3.00	.52 - .60
SED -0225- PFV SHD	208-230/1/60	16.7	74.0	FRN-25	35	2.70 - 3.10	.62 - .72
SRE -0250- PFV	208-230/1/60	16.8	85.0	FRN-30	40	2.37 - 2.80	.59 - .72
PFB	230/1/60	17.6	85.0	FRN-30	40	2.36 - 3.0	.52 - .60
SRK -0250- PFV	208-230/1/60	16.8	85.0	FRN-30	40	2.37 - 2.80	.59 - .72
PFH	208/1/60	19.6	90.0	FRN-30	45	2.46 - 2.84	.50 - .58
PFB	230/1/60	17.9	85.0	FRN-30	40	2.36 - 3.0	.52 - .60
PFJ	265/1/60	15.3	73.0	FRN-30	35	3.26 - 3.75	.77 - .89
TFC	208-230/3/60	10.7	70.0	FRN-20	20		1.04 - 1.20
PFG	230/1/50	17.0	68.0	FRN-30	35	3.26 - 3.75	.77 - .89
SEK -0250- PFV	208-230/1/60	16.8	85.0	FRN-30	40	2.37 - 2.73	.63 - .72
SHK -0250- PFV	208-230/1/60	18.8	85.0	FRN-30	40	2.44 - 2.80	.59 - .68

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
SRD -0225- PFH	35/370	41-53/220	145-175/220	040-0001-26	
PFV	35/370	41-53/220	108-120/220	040-0001-26	
PFB	35/370	41-53/220	145-175/220	040-0001-26	
PFJ	35/440	41-53/320	108-120/320	040-0001-20	
TFC					
PFZ	35/370	41-53/320	108-120/320	040-0001-20	
PFG	35/370	41-53/220	108-120/220	040-0001-27	
PFI	40/370	41-53/320	108-120/320	040-0001-27	
PAG	35/370	41-53/220	108-120/220	040-0001-27	071-0127-11
SRJ -0225- PFV	35/370	41-53/320	135-155/320	040-0001-26	
PFB	35/370	88-108/220	145-175/220	040-0001-26	
SED -0225- PFV SHD	35/370	41-53/220	108-120/220	040-0001-26	
SRE -0250- PFV	35/370	41-53/320	176-216/320	040-0001-26	
PFB	35/370	88-108/220	145-175/220	040-0001-26	
SRK -0250- PFV	40/370	41-53/320	176-216/320	040-0001-26	
PFH	40/370	41-53/220	145-175/220	040-0001-26	
PFB	40/370	88-108/220	145-175/220	040-0001-26	
PFJ	40/440	41-53/320	108-120/320	040-0001-20	
TFC					
PFG	40/370	41-53/320	108-120/320	040-0001-27	
SEK -0250- PFV	40/370	41-53/320	176-216/320	040-0001-26	
SHK -0250- PFV	40/440	41-53/320		040-0001-26	

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
SRM -0275- PFV	208-230/1/60	18.0	97.0	FRN-30	45	2.64 - 3.04	.47 - .54
PFH	208/1/60	20.0	94.0	FRN-35	50	2.37 - 2.73	.42 - .48
PFB	230/1/60	19.9	87.0	FRN-30	45	2.79 - 3.85	.52 - .60
SEM -0275- PFV	208-230/1/60	16.9	97.0	FRN-30	45	2.64 - 3.04	.47 - .54
SHM		20.3	97.0				

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
SRM -0275- PFV	40/440	41-53/320	94-113/320	040-0001-20	
PFH	40/370	61-72/250	145-175/220	040-0001-26	
PFB	40/370	61-72/250	145-175/220	040-0001-26	
SEM -0275- PFV SHM	40/440	41-53/320	94-113/320	040-0001-20	

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
YSB -0150- CFV	208-230/1/60	12.2	62.0	FRN-25	30	4.37 - 5.03	.86 - .99
TFC	208-230/3/60	6.8	43.0	FRN-12	15		2.05 - 2.35
YSC -0150- CFG	230/1/50	12.0	49.0	FRN-20	25	4.98 - 5.72	1.12 - 1.28
YRB -0200- CFV	208-230/1/60	14.1	68.0	FRN-25	30	2.79 - 3.21	.77 - .89
TFC	208-230/3/60	8.6	56.0	FRN-15	20		1.40 - 1.61
YRC -0200- CFG	230/1/50	16.0	69.0	FRN-25	35	3.39 - 3.91	.77 - .89
TFR	208-240/3/50	9.5	48.0	FRN-15	20		2.05 - 2.35
YSD -0250- CFV	208-230/1/60	17.0	85.0	FRN-30	45	2.93 - 3.37	.60 - .69
TFC	208-230/3/60	8.4	56.0	FRN-15	20		1.40 - 1.61
YRB -0300- PFH	208/1/60	25.0	106.0	FRN-40	50	3.44 - 3.96	.42 - .48
PFB	230/1/60	22.3	102.0	FRN-30	45	2.66 - 3.57	.42 - .57
PFV	208-230/1/60	22.4	111.0	FRN-30	45	2.33 - 3.19	.41 - .52
TFC	208-230/3/60	12.7	77.0	FRN-25	35		.91 - 1.07
TFD	460/3/60	5.9	38.5	FRS-12	15		3.55 - 4.09
YEB -0300- PFB	230/1/60	20.2	102.0	FRN-30	45	2.66 - 3.57	.42 - .57
YRE -0300- CFB	230/1/60	21.1	112.0	FRN-30	45	2.90 - 3.34	.45 - .51
TFC	208-230/3/60	13.9	77.0	FRN-25	35		.91 - 1.04
YSD -0300- TFD	460/3/60	5.5	38.5	FRS-12	15		3.55 - 4.09
YRB -0301- PFV YEB	208-230/1/60	22.3	102.0	FRN-30	45	2.66 - 3.76	.42 - .53
YHB -0301- PFV	208-230/1/60	22.4	102.0	FRN-30	45	2.66 - 3.06	.50 - .57

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
YSB -0150- CFV TFC	25/370		135-155/320	040-0001-16	
YSC -0150- CFG	25/370		145-175/220	040-0001-10	
YRB -0200- CFV TFC	35/370		135-155/320	040-0001-19	
YRC -0200- CFG TFR	35/370		145-175/220	040-0001-29	
YSD -0250- CFV TFC	35/370		216-259/220	040-0001-19	
YRB -0300- PFH PFB PFV TFC TFD	35/440 35/440 35/440	88-108/220 81-90/320 88-108/220	216-259/220 216-259/220 216-259/220	040-0001-19 040-0001-12 040-0001-19	
YEB -0300- PFB	35/440	81-90/320	216-259/220	040-0001-12	
YRE -0300- CFB TFC	35/440		216-259/220	040-0001-12	
YSD -0300- TFD					
YRB -0301- PFV YEB	35/440	81-90/320	216-259/220	040-0001-12	
YHB -0301- PFV	35/480	81-90/320	216-259/220	040-0001-12	

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms	
		Rated Load	Locked Rotor	Fusetron	*Std.	Start Winding	Run Winding
YRC -0350- PFV	208-230/1/60	25.3	130.0	FRN-50	70	2.17 - 2.49	.34 - .39
TFC	208-230/3/60	14.3	92.0	FRN-25	35		.74 - .85
TFD	460/3/60	6.7	46.0	FRS-15	15		2.86 - 3.30
PFB	230/1/60	24.8	111.0	FRN-40	60	2.33 - 3.19	.40 - .47
PFH	208/1/60	24.8	114.0	FRN-50	60	2.84 - 3.26	.34 - .39
PFG	230/1/50	20.0	98.0	FRN-40	45	3.44 - 3.96	.47 - .55
TFR	208-220/3/50	14.0	76.0	FRN-25	30		.93 - 1.07
YEC -0350- PFB	230/1/60	25.1	111.0	FRN-40	60	2.33 - 3.19	.40 - .47
YHC -0350- PFV	208-230/1/60	25.1	130.0	FRN-50	70	2.17 - 2.49	.34 - .39
YRD -0400- PFV	208-230/1/60	32.6	145.0	FRN-50	70	1.56 - 2.49	.27 - .35
TFC	208-230/3/60	15.3	108.0	FRN-40	45		.64 - .74
TFE	575/3/60	7.2	44.0	FRS-15	15		3.72 - 4.28
TFD	460/3/60	8.1	54.0	FRS-15	20		2.38 - 2.74
PFB	230/1/60	28.1	135.0	FRN-50	70	2.20 - 2.54	.30 - .34
PFH	208/1/60	29.6	134.0	FRN-50	75	2.13 - 2.45	.28 - .32
YHD -0400- PFV	208-230/1/60	28.0	145.0	FRN-50	70	2.05 - 2.35	.30 - .34
YRF -0450- PFB	230/1/60	28.3	145.0	FRN-50	70	2.17 - 2.49	.27 - .31
YRE -0500- PFB	230/1/60	32.9	148.0	FRN-60	80	1.60 - 1.87	.24 - .31
TFC	208-230/3/60	19.9	132.0	FRN-50	50		.43 - .62
TFD	460/3/60	9.3	66.0	FRS-20	25		1.60 - 1.84
TFE	575/3/60	9.0	56.0	FRS-15	20		2.42 - 2.78
PFV	208-230/1/60	35.9	175.0	FRN-60	80	1.40 - 1.67	.21 - .26
YHE -0500- PFV	208-230/1/60	37.3	175.0	FRN-60	80	1.24 - 1.64	.21 - .25

*Fusetron recommended - standard quick trip fuse might blow in event of locked rotor.

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Run Capacitor MFD/V	Start Capacitor		Relay	Protector
		Supplementary MFD/V	High Torque MFD/V		
YRC -0350- PFV	40/440	94-113/320	176-216/320	040-0001-19	
TFC					
TFD					
PFB	40/440	81-90/320	216-259/220	040-0001-19	
PFH	40/440	94-113/320	108-120/320	040-0001-16	
PFG	40/440	41-53/320	175-216/320	040-0001-10	
TFR					
YEC -0350- PFB	40/440	81-90/320	216-259/220	040-0001-19	
YHC -0350- PFV	40/480	94-113/320	176-216/320	040-0001-19	
YRD -0400- PFV	45/440	81-90/320	216-240/320	040-0001-12	
TFC					
TFE					
TFD					
PFB	40/440	81-90/320	216-240/320	040-0001-12	
PFH	45/440	81-90/320	216-240/320	040-0001-12	
YHD -0400- PFV	45/440	81-90/320	216-240/320	040-0001-12	
YRF -0450- PFB	45/440	81-90/320	216-240/320	040-0001-12	
YRE -0500- PFB	55/440	108-120/220	270-310/320	040-0001-19	
TFC					
TFD					
TFE					
PFV	55/440	108-120/320	270-310/320	040-0001-19	
YHE -0500- PFV	55/440				

ELECTRICAL DATA
COPELAWELD COMPRESSORS

Compressor Model	Voltage	Motor Amps		Fuse Size Recommended Max.		Winding Resistance in Ohms
		Rated Load	Locked Rotor	Fusetron	*Std.	
PRA -0750- THC	208-230/3/60	36.0	208.0	FRN-60	80	.34
THD	460/3/60	16.0	104.0	FRS-25	35	1.24 - 1.37
THE	575/3/60	14.2	86.0	FRS-25	30	2.16
BRE -0750- TSC	208-230/3/60	35.3	194.0	FRN-60	80	.35 - .41
TSD	460/3/60	16.1	97.0	FRS-25	40	1.18 - 1.50
TSE	575/3/60	18.8	78.5	FRS-25	40	1.87 - 2.15
BRG -0900- TSC	208-230/3/60	39.0	194.0	FRN-70	90	.30 - .37
TSD	460/3/60	19.9	97.0	FRS-40	50	1.18 - 1.50
TSE	575/3/60	18.8	78.5	FRS-25	40	1.87 - 2.15
BRK -1200- TSC	208-230/3/60	48.8	267.0	FRN-100	125	.20 - .26
TSD	460/3/60	27.6	135.0	FRS-60	70	.80 - .98
TSE	575/3/60	25.8	108.0	FRS-45	50	1.26 - 1.44

*Fusetron recommended - Standard quick trip fuse might blow in event of locked rotor.

ELECTRICAL COMPONENTS
COPELAWELD COMPRESSORS

Compressor Model	Protector	
	Std. or 240V	120V
PRA -0750- THC	071-0338-07	
THD	071-0339-19	
THE	071-0339-16	
BRE -0750- TSC	071-0396-00	071-0396-01
TSD	071-0396-00	071-0396-01
TSE	071-0396-00	071-0396-01
BRG -0900- TSC	071-0396-00	071-0396-01
TSD	071-0396-00	071-0396-01
TSE	071-0396-00	071-0396-01
BRK -1200- TSC	071-0397-00	071-0397-01
TSD	071-0397-00	071-0397-01
TSE	071-0397-00	071-0397-01

POTENTIAL RELAY DATA

COPELAND Part No.	G.E. Part No.	R.B.M. Part No.	Pick Up Volts-Hot	Drop Out Volts	Cont. Volt. Rating	Frequency Cycles
040-0001-00	3ARR3CT6D5	128146-1653DK	320 - 340	60 - 140	395	60
040-0001-01	3ARR3CT7N5	128146-1613MK	150 - 160	20 - 55	130	60
040-0001-03	3ARR3CT3E5	128146-1633EK	340 - 360	45 - 115	256	60
040-0001-04	3ARR3CT24E5	128146-1643EK	340 - 360	55 - 125	336	60
040-0001-05	3ARR3CT10B5	128146-1643BK	280 - 300	55 - 125	336	60
040-0001-08	3ARR3CT4D5	128146-1663DK	320 - 340	75 - 160	420	60
040-0001-09	3ARR3CT3C5	128146-1633CK	300 - 320	45 - 115	256	60
040-0001-10	3ARR3CT6AB5	F128146-1653BK	280 - 300	60 - 140	336	50
040-0001-11	3ARR3CT5P5	128146-1633PK	170 - 180	45 90	256	60
040-0001-12	3ARR3CT6A5	128146-1663AK	260 - 280	75 - 150	420	60
040-0001-14	3ARR3CT3AU5	F128146-1643UK	220 - 240	55 - 119	286	50
040-0001-16	3ARR3CT6C5	128146-1663CK	300 - 320	75 - 160	420	60
040-0001-19	3ARR3CT10V5	128146-1653VK	240 - 260	75 - 150	395	60
040-0001-20	3ARR3CT10S5	128146-1653SK	190 - 200	60 - 130	395	60
040-0001-22	3ARR3CT7J5	128146-1613JK	120 - 130	20 - 50	130	60
040-0001-23	3ARR3CT7AL5	F128146-1623LK	140 - 150	30 - 62	145	50
040-0001-24	3ARR3CT5V5	128146-1633VK	240 - 260	45 - 95	256	60
040-0001-25	3ARR3CT5M5	128146-1633MK	150 - 160	45 - 90	256	60
040-0001-26	3ARR3CT3S5	128146-1643SK	190 - 200	55 - 115	336	60
040-0001-27	3ARR3CT10AS5	F128146-1653SK	190 - 200	60 - 124	336	50
040-0001-29	3ARR3CT26AU5	F128146-1663UK	220 - 240	75 - 142	380	50
040-0001-30	3ARR3CT23AA5	F128146-1633AK	260 - 280	45 - 109	236	50
040-0001-31	3ARR3CT25AC5	F128146-1653CK	300 - 320	60 - 133	336	50
040-0001-33	3ARR3CT27AA5	F128146-1673AK	260 - 280	75 - 170	435	50

POTENTIAL RELAY DATA

COPELAND Part No.	G.E. Part No.	R.B.M. Part No.	Pick Up Volts-Hot	Drop Out Volts	Cont. Volt. Rating	Frequency Cycles
040-0002-00	3ARR3CD4AF4	F128156-2876FK	350 - 370	60 - 135	435	50
040-0002-01	3ARR3CD4AF4	128156-2866FK	350 - 370	60 - 145	420	60
040-0002-02		F128156-2866BK	280 - 300	70 - 121	358	50
040-0002-03		128156-2856BK	280 - 300	50 - 120	396	60
040-0003-00	3ARR3JA75I	128186-1311JK	120 - 130	15 - 50	130	60
040-0003-01	3ARR3JA6F1	128186-1361FK	350 - 370	60 - 160	420	60
040-0003-02	3ARR3JA7M1	128186-1311MK	150 - 160	15 - 55	130	60
040-0003-03	3ARR3JA5D1	128186-1331DK	320 - 340	45 - 115	253	60
040-0003-04		128186-1341RK	180 - 190	55 - 115	336	60
040-0003-05	3ARR3JA3D1	128186-1341DK	320 - 340	50 - 125	332	60
040-0003-06	3ARR3JA5B1	128186-1331BK	280 - 300	35 - 95	253	60
040-0003-07	3ARR3JA6D1	128186-1351DK	320 - 340	60 - 140	395	60
040-0003-08		128186-1331PK	170 - 180	45 - 90	256	60
040-0003-09	3ARR3JA5AA1	F128186-1331AK	260 - 280	35 - 115	228	50
040-0003-10	3ARR3JA7AL1	F128186-1311LK	140 - 150	10 - 55	117	50
040-0003-11	3ARR3JA3AC1	F128186-1341CK	300 - 320	55 - 145	286	50
040-0003-12	3ARR3JA5AC1	F128186-1331CK	300 - 320	35 - 115	228	50
040-0003-13	3ARR3JA5D3		320 - 340	35 - 77	253	60
040-0003-14	3ARR3JA3BA1		290 - 310	50 - 100	332	60
040-0003-15	3ARR3JA4F1		350 - 370	60 - 135	502	60
040-0003-16	3ARR3JA6A1	128186-1361AK	260 - 280	60 - 150	420	60
040-0003-17	3ARR3JA8AN1	F128186-1331NK	160 - 170	25 - 90	193	50
040-0003-18	3ARR3JA3V1	128186-1331VK	240 - 260	40 - 95	256	60
040-0003-19	3ARR3JA3E1	128186-1331EK	340 - 360	45 - 115	256	60

POTENTIAL RELAY DATA

COPELAND Part No.	G.E. Part No.	R.B.M. Part No.	Pick Up Volts-Hot	Drop Out Volts	Cont. Volt. Rating	Frequency Cycles
040-0003-20	3ARR3JA3AV1	F128186-1341UK	220 - 240	40 - 115	286	50
050-0003-21	3ARR3JA7N1	128186-1311NK	160 - 170	15 - 55	130	60
040-0003-22	3ARR3JA6AB1	F128186-1351BK	280 - 300	60 - 140	336	50
040-0003-23	3ARR3JA3R1	128186-1331RK	180 - 190	40 - 95	256	60
040-0003-24	3ARR3JA3C1	128186-1331CK	300 - 320	45 - 115	256	60
040-0003-25		128186-1341EK	340 - 360	55 - 125	336	60
040-0003-26	3ARR3JA10B1	128186-1341BK	280 - 300	50 - 125	336	60
040-0003-27	3ARR3JA2P1	128186-1321PK	170 - 180	20 - 65	168	60
040-0003-28	3ARR3JA4D1	128186-1361DK	320 - 340	60 - 160	420	60
040-0007-00	3ARR3C7M2		150 - 160	15 - 45	130	60
040-0007-02	3ARR35AA2		260 - 280	35 - 77	228	50
040-0007-03	3ARR3C5AL2		140 - 150	15 - 40	117	50
040-0007-04	3ARR3C24E2		340 - 360	55 - 125	336	60
040-0007-05	3ARR3C5M2		150 - 160	35 - 77	253	60
040-0008-00		128990-1361K	350 - 370	75 - 160	420	60
040-0008-01		128990-1351K	320 - 340	60 - 140	395	60
040-0008-02		128990-1371K	150 - 160	20 - 55	130	60
040-0008-03		128990-1381K	320 - 340	45 - 115	256	60
040-0008-04		F128990-1391K	130 - 140	20 - 52	118	50
040-0008-05		F128990-1401K	260 - 280	45 - 109	236	50
040-0008-06		128990-1421K	180 - 190	45 - 95	256	60
040-0008-07		F128990-1431K	300 - 320	55 - 138	286	50
040-0008-08		F128990-1491K	240 - 260	75 - 152	380	50

POTENTIAL RELAY DATA

COPELAND Part No.	G.E. Part No.	R.B.M. Part No.	Pick Up Volts-Hot	Drop Out Volts	Cont. Volt. Rating	Frequency Cycles
040-0008-09		128990-1501K	340 - 360	75 - 160	420	60
040-0008-10		F128990-1511K	190 - 200	45 - 90	236	50
040-0008-11		128990-1521K	280 - 300	55 - 125	336	60
040-0012-00		128156-2346RK	180 - 190	40 - 90	336	60
040-0012-01		F128156-2366BK	280 - 300	60 - 121	380	50
040-0012-02		128156-2356DK	320 - 340	50 - 145	396	60
040-0012-03		F128156-2366VK	240 - 260	60 - 150	380	50
040-0012-04		F128156-2366AK	260 - 280	60 - 150	380	50
040-0014-00	3ARR1Z6D4	128152-1946DK	320 - 340	50 - 110	336	60
040-0014-01	3ARR1Z3R4	128152-1946DK	180 - 190	40 - 90	332	60
040-0014-02	3ARR3Z4F4	128156-1966FK	350 - 370	60 - 145	420	60
040-0014-03	3ARR3Z3P4	128152-1936PK	170 - 180	35 - 80	256	60
040-0014-04	3ARR3Z3U4	128156-1946UK	220 - 240	40 - 115	332	60
040-0014-05		128152-1936CK	300 - 320	35 - 90	256	60
040-0014-06	3ARR3Z4AF4	F128156-1976FK	350 - 370	60 - 135	435	50
040-0014-07		F128152-1936RK	180 - 190	35 - 77	236	50
040-0014-08	3ARR3Z5R4		180 - 190	35 - 77	253	60
040-0014-09	3ARR3Z10T4	128156-1946TK	200 - 220	40 - 115	336	60
040-0014-10	3ARR3Z10U4		220 - 240	50 - 110	375	60
040-0014-11	3ARR3Z10A4	128156-1956AK	260 - 280	60 - 140	395	60
040-0015-00		128990-1486K	320 - 340	60 - 140	395	60
040-0046-00		128990-1593K	340 - 360	55 - 125	336	60
040-0046-01		128990-1603K	320 - 340	60 - 140	395	60
040-0046-02		128990-1613K	320 - 340	75 - 160	420	60

POTENTIAL RELAY DATA

COPELAND Part No.	G.E. Part No.	R.B.M. Part No.	Pick Up Volts-Hot	Drop Out Volts	Cont. Volt. Rating	Frequency Cycles
040-0046-03		128990-1623K	180 - 190	45 - 95	256	60
040-0046-05		128990-1663K	300 - 320	45 - 115	256	60
040-0046-07		128990-1693K	280 - 300	55 - 125	336	60
040-0046-09		128990-1873K	150 - 160	20 - 55	130	60
040-0046-10		128990-1883K	340 - 360	45 - 115	256	60
040-0046-11		F128990-1893K	280 - 300	60 - 140	336	50
040-0046-12		F128990-1903K	140 - 150	30 - 62	145	50
040-0046-13		F128990-1913K	260 - 280	45 - 109	236	50
040-0046-15		F128990-1993K	300 - 320	60 - 133	336	50
040-0104-00	3ARR3CT21J5		120 - 130	20 - 50	130	60

CURRENT RELAY DATA

COPELAND Part No.	T.I. Part No.	G.E. Part No.	Maximum Pick Up Amps	Minimum Drop Out Amps
040-0004-00	9660-083-152		8.10	6.80
040-0004-01	9660-083-155		8.50	7.15
040-0004-02	9660-083-161		9.75	8.20
040-0004-03	9660-083-170		12.2	10.2
040-0004-04	9660-083-168		11.6	9.70
040-0004-05	9660-083-178		15.8	13.3
040-0004-07	9660-083-121		4.20	3.55
040-0004-08	9660-083-189		21.9	18.2
040-0004-09	9660-083-138		6.20	5.25
040-0004-10	9660-083-172		13.2	11.1
040-0088-00	6409-26-196		28.9	23.7
040-0088-02	6409-26-180		17.4	14.3
040-0088-03	6409-26-176		14.9	12.6
040-0088-04	6409-26-935		33.6	27.8
040-0088-05	6409-26-189		21.8	17.9
040-0089-04	3CR203-171	3ARR12-PB198	12.9	10.8
040-0089-06	3CR203-186	3ARR12-PB253	22.5	18.7
040-0089-07	3CR203-181	3ARR12-PB256	17.9	15.1
040-0090-00	3CR206-174	3ARR12-PV202	14.1	11.9
040-0090-01	3CR206-181	3ARR12-PV203	17.9	15.1
040-0090-02	3CR206-171	3ARR12-PV239	12.9	10.8
040-0090-04	3CR206-291	3ARR12K-PV255	27.2	22.7
040-0090-05	3CR206-165	3ARR12K-PV254	10.4	8.6

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
¼ H.P.										
115-1-60										
115-1-50										
E	050-0243-00	1	6W	1450	115-1-50/60	35	.6	083-0019-00	8¾"-23°-3	365
F	050-0243-00	1	6W	1450	115-1-50/60	40	.6	083-0046-00	7¾"-50°-6	370
230-1-60										
230-1-50										
E	050-0241-01	1	9W	1450	230-1-50/60	35	.4	083-0019-00	8¾"-23°'3	365
⅓ H.P.										
115-1-60										
115-1-50										
E	050-0243-00	1	6W	1450	115-1-50/60	35	.6	083-0019-00	8¾"-23°'3	365
F	050-0243-00	1	6W	1450	115-1-50/60	46	.6	083-0046-00	7¾"-50°-6	350
230-1-60										
230-1-50										
E	050-0241-01	1	9W	1450	230-1-50/60	35	.4	083-0019-00	8¾"-23°-3	365
½ H.P.										
115-1-60										
115-1-50										
D,E	050-0241-00	1	9W	1450	115-1-50/60	55	.8	083-0026-00	10"-22°'4	480
F	050-0241-00	1	9W	1450	115-1-50/60	55	.8	083-0104-00	10"-26°-4	480
T	050-0241-00	1	9W	1450	115-1-50/60	55	.8	083-0026-00	10"-22°-4	480

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
½ H.P. 208-1-60 230-1-60 208/230-3-60 230/1/50										
D,E	050-0241-01	1	9W	1450	230-1-50/60	55	.4	083-0026-00	10''-22°-4	480
F	050-0241-01	1	9W	1450	230-1-50/60	55	.4	083-0104-00	10''-26°-4	480
T	050-0241-01	1	9W	1450	230-1-50/60	55	.4	083-0026-00	10''-22°-4	480
¾ H.P. 115-1-60 115-1-50										
C	050-0237-01	1	50W	1450	115-1-50/60	122	2.2	083-0100-00	16''-17°-3	1260
D	050-0241-00	2	9W	1450	115-1-50/60	85	1.6	083-0019-00	8¾''-23°-3	660
E	050-0244-01	1	50W	1450	115-1-50/60	130	2.2	083-0099-00	12''-24°-3	800
F	050-0244-01	1	50W	1450	115-1-50/60	130	2.2	083-0102-00	11½''-26°-4	760
T	050-0241-00	2	9W	1450	115-1-50/60	85	1.6	083-0019-00	8¾''-23°-3	660
208-1-60 230-1-60 208/230-3-60 230-1-50										
C	050-0237-00	1	50W	1450	230-1-50/60	122	1.1	083-0100-00	16''-17°-3	1260
D	050-0241-01	2	9W	1450	230-1-50/60	85	.8	083-0019-00	8¾''-23°-3	660
E	050-0244-00	1	50W	1450	230-1-50/60	130	1.1	083-0099-00	12''-24°-3	800
F	050-0244-00	1	50W	1450	230-1-50/60	130	1.1	083-0102-00	11½''-26°-4	760
T	050-0241-01	2	9W	1450	230-1-50/60	85	.8	083-0019-00	8¾''-23°-3	660

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
1 H.P. 115-1-60 115-1-50										
D	050-0241-00	2	9W	1450	115-1-50/60	120	1.6	083-0026-00	10"-22°'4	960
E	050-0244-01	1	50W	1450	115-1-50/60	130	2.2	083-0099-00	12"-24°-3	800
F	050-0244-01	1	50W	1450	115-1-50/60	120	2.2	083-0102-00	11½-26°-4	715
T	050-0241-00	2	9W	1450	115-1-50/60	120	1.6	083-0026-00	10"-22°-4	960
208-1-60 230-1-60 208/230-3-60 230-1-50										
C	050-0242-00	1	1/6	1550	230-1-50/60	329	2.8	083-0056-00	16"-22°-4	1485
D	050-0241-01	2	9W	1450	230-1-50/60	120	.8	083-0026-00	10"-22°-4	960
E	050-0244-00	1	50W	1450	230-1-50/60	130	1.1	083-0099-00	12"-24°-3	800
F	050-0244-00	1	50W	1450	230-1-50/60	130	1.1	083-0102-00	11½"-26°-4	715
T	050-0241-01	2	9W	1450	230-1-50/60	120	.8	083-0026-00	10"-22°-4	960
380-3-50 460-3-60										
C	050-0242-01	1	1/5	1550	380/440-1-50/60	329	1.5	083-0056-00	16"-22°-4	1485
D	050-0241-04	2	9W	1550	440-1-60	120	.4	083-0026-00	10"-22°-4	960
E	050-0245-02	1	1/12	1550	380/440-1-50/60	130	.95	083-0028-00	12"-24°-3	800

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
1½ H.P.										
230-1-50										
200-3-50										
208-1-60										
230-1-60										
208/230-3-60										
C	050-0242-00	1	1/6	1550	230-1-60	329	2.8	083-0056-00	16''-22°-4	1840
D	050-0245-01	2	1/20	1550	230-1-50/60	270	2.4	083-0030-00	12''-21°-4	1665
F	050-0017-04	1	1/12	1550	230-1-60	260	1.9	083-0082-00	14''-28°-4	1050
F	050-0244-00	2	50W	1450	230-1-50/60	250	1.1	083-0101-00	12''-28°-3	1730
	050-0237-00		50W	1450	230-1-50/60	250	1.1			
T	050-0108-00	1	1/3	1625	230-1-50/60	335	2.2	083-0024-00	14''-33°-4	1320
380-3-50										
460-3-60										
C	050-0242-01	1	1/5	1550	380/440-1-50/60	329	1.5	083-0056-00	16''-22°-4	1840
D	050-0245-02	2	1/12	1550	380/440-1-50/60	270	1.9	083-0030-00	12''-21°-4	1665
T	050-0008-00	1	1/4	1725	440/3/60	335	.55	083-0024-00	14''-33°-4	1320
575-3-60										
C	050-0242-02	1	1/5	1550	550-1-60	329	1.2	083-0056-00	16''-22°-4	1840
D	050-0017-06	2	1/12	1550	550-1-60	270	1.5	083-0030-00	12''-21°-4	1665

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
2 H.P.										
208-1-60										
230-1-50										
230-1-60										
208/230-3-60										
C	050-0238-00	1	1/4	1550	230-1-50/60	390	1.4	083-0112-00	16''-32°-3	1980
D	050-0245-01	2	1/20	1550	230-1-50/60	300	2.4	083-0028-00	12''-24°-3	1750
F	050-0244-00	2	50W	1450	230-1-50/60	280	2.2	083-0103-00	14''-22°-3	2000
T	050-0108-00	1	1/3	1625	230-1-50/60	340	2.2	083-0024-00	14''-33°-4	1320
380-3-50										
460-3-60										
C	050-0238-01	1	1/4	1625	380/440-1-50/60	390	1.0	083-0112-00	16''-32°-3	1980
D	050-0245-02	2	1/12	1550	380/440-1-50/60	300	1.9	083-0028-00	12''-24°-3	1750
T	050-0008-00	1	1/4	1725	440-3-60	340	.55	083-0024-00	14''-33°-4	1320
575-3-60										
C	050-0238-03	1	1/4	1625	550-1-60	390	.6	083-0112-00	16''-32°-3	1980
D	050-0017-06	2	1/12	1550	550-1-60	300	1.5	083-0028-00	12''-24°-3	1750

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
3 H.P. 230-1-50 230-1-60 200-3-50 208/230-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	500	2.2	083-0057-01	24''-36°-3	4070
F	050-0166-00	2	1/12	1550	230-1-50/60	660	3.6	083-0082-00	14''-28°-4	2100
T	050-0108-00	1	1/3	1625	230-1-50/60	450	2.2	083-0072-00	16''-32°-4	2300
T	050-0108-00	1	1/3	1625	230-1-50/60	340	2.2	083-0024-00	14''-33°-4	1320
380-3-50 460-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	500	2.2	083-0057-01	24''-36°-3	4070
T	050-0008-00	1	1/4	1725	440-3-60	450	.55	083-0072-00	16''-32°-4	2300
T	050-0008-00	1	1/4	1725	440-3-60	340	.55	083-0024-00	14''-33°-4	1320
575-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	500	2.2	083-0057-01	24''-36°-3	4070

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR							FAN BLADE		
	Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	Part Number	Description	CFM Air Vol.
4 H.P. 230-1-60 208/230-3-60										
F	050-0173-00	2	1/4	1070	230-1-60	500	3.2	083-0081-00	20''-32°-4	5200
460-3-60										
F	050-0173-01	2	1/4	1075	480-1-50/60	500	1.6	083-0081-00	20''-32°-4	5200
5 H.P. 230-1-60 208/230-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	520	2.6	083-0108-00	24''-38°-6	3820
F	050-0173-00	2	1/4	1070	230-1-60	500	3.2	083-0081-00	20''-32°-4	5200
T	050-0108-00	2	1/3	1625	230-1-50/60	680	4.4	083-0072-00	16''-32°-4	4600
380-3-50 460-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	520	2.6	083-0108-00	24''-38°-6	3820
F	050-0173-01	2	1/4	1075	480-1-50/60	500	1.6	083-0081-00	20''-32°-4	5200
575-3-60										
C	050-0234-00	1	1/3	825	230-1-50/60	520	2.6	083-0108-00	24''-38°-6	3820
F	050-0173-00	2	1/4	1070	230-1-60	500	3.2	083-0081-00	20''-32°-4	5200

Note: on two fan units, watts and amps are for both motors.

CONDENSING UNIT FAN MOTORS

Condensing Unit	FAN MOTOR Part Number	Qty Used	H.P.	RPM	Electrical Characteristics	Watts	Amps	FAN BLADE Part Number	Description	CFM Air Vol.
7½ H.P. 208/230-3-60										
C -HT	050-0234-00	2	1/3	825	230-1-50/60	1040	5.2	083-0057-01	24''-36°-3	8140
C -MT	050-0236-00	1	1	1140	230/460-3-60	1270	3.8	083-0111-00	24''-34°-5	4400
C -LT	050-0234-00	1	1/3	825	230-1-50/60	520	2.6	083-0063-00	24''-30°-6	3540
380-3-50 460-3-60										
C -HT	050-0234-00	2	1/3	825	230-1-50/60	1040	5.2	083-0057-01	24''-36°-3	8140
C -MT	050-0236-00	1	1	1140	230/460-3-60	1270	1.9	083-0111-00	24''-34°-5	4400
C -LT	050-0234-00	1	1/3	825	230/1/50/60	520	2.6	083-0063-00	24''-30°-6	3540
575-3-60										
C -HT	050-0234-00	2	1/3	825	230-1-50/60	1040	5.2	083-0057-01	24''-36°-3	8140
C -MT	050-0193-00	1	1	1140	550-3-60	1270	1.5	083-0111-00	24''-34°-5	4400
C -LT	050-0234-00	1	1/3	825	230-1-50/60	520	2.6	083-0063-00	24''-30°-6	3540
10 H.P. 380-3-50 208/230-3-60 460-3-60 575-3-60										
C	050-0234-00	2	1/3	825	230-1-50/60	1040	5.2	083-0063-00	24''-30°-6	7100

Note: on two fan units, watts and amps are for both motors.

18. WIRING DIAGRAMS

The wiring diagram index lists motor-compressors by model designation and horsepower, against an Electrical Characteristics Code. (Third group of letters in Model No.)

These diagrams represent typical wiring of the motor-compressors listed but are not necessarily identical to the diagram in the terminal box.

Several single phase wiring diagrams show a choice of capacitor arrangements such as two start with one run, two start with two run, and various series and parallel combinations. The combinations are all possible but the most commonly used arrangement is the one shown as connected immediately below the relay.

INDEX TO ELECTRICAL WIRING DIAGRAMS

COPELAWELD 2 POLE MOTOR-COMPRESSOR

WIRING DIAGRAMS

Motor-Compressor	Electrical Characteristics					
	PA*,1A*, CA*	PF*,CF* Current Relay	SA*,1A*, CA* Current Relay	TF*	TH*	TS*
J	573		1522			
R	1520	1521	1522	0607		
S	1520	1521		0607		
Y		529		0607		
PR					553	
BRG-0900						633
BRK-1200						632

*May be any letter depending on electrical characteristics.

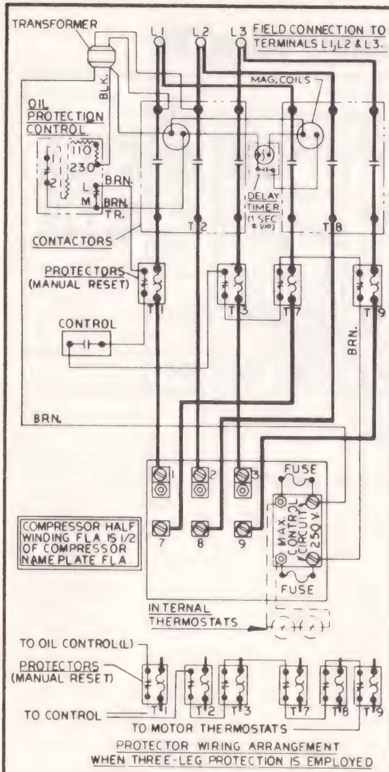
COPELAMETIC WIRING DIAGRAMS

Motor-Compressor	Electrical Characteristics							
	1A*,SA* Current Relay	1A*, CA* Potential Relay	TA*	TFC	TFD TFE	CF*	THC	THD THE
H	1504	1502						
K		1502	513					
EA		1502	513					
ER		1519	513					
3A		1502	513					
3R		1502	517					
LA		1501	517					
NR				1064	1063	1070		
MR				1064	1063	1070		
9R				1064	1063	1070	503	504

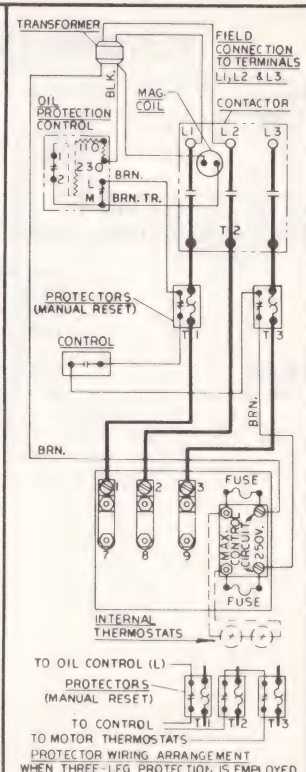
*May be any letter depending on electrical characteristics.

COPELAMETIC WIRING DIAGRAMS

Motor-Compressor	Electrical Characteristics						
	TDK	TMK	TDE	TSK 115V.	TSK 230V.	TSE 115V.	TSE 230V.
4R,6R,-2500,3500,4000		525		610	608	613	612
4R,6R-0750,1000,1500, 2000,3000	580		351	618	616	636	635
	FSM FSR 115V.	FSM 230V.	FSR 230V.	EML	EMM		
4R,6R	613	612	622	591	594		

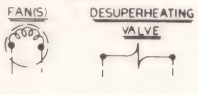


550/600 VOLT
PART WINDING START
(USE ALSO FOR 500 VOLT 50 CY.)



550/600 VOLT
ACROSS THE LINE
(USE ALSO FOR 500 VOLT 50 CY.)

WIRING ARRANGEMENT FOR *CAPACITY CONTROL VALVE(S) (*UNLOADING VALVE), FAN(S), DESUPERHEATING SOLENOID VALVE WHEN REQUIRED - LEADS ARE CONNECTED TO TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR IN STARTER PANEL.



WHEN REQUIRED: *CAPACITY CONTROL VALVE(S) (*UNLOADING VALVE), FAN(S), DESUPERHEATING SOLENOID VALVE, HAVING VOLTAGE DIFFERENT THAN LINE VOLTAGE - CONNECT THRU A SUITABLE TRANSFORMER.

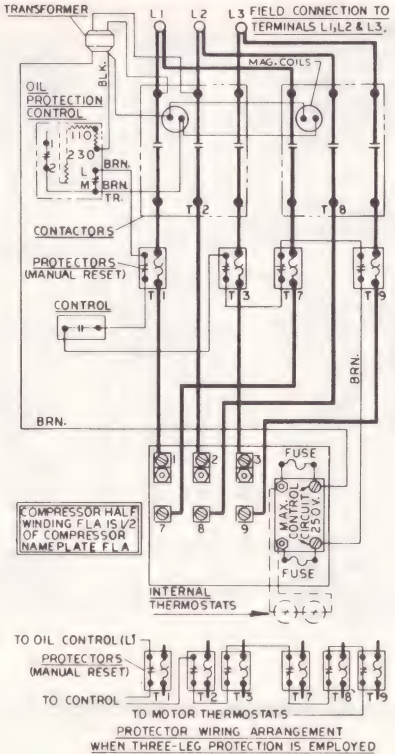
FAN(S), VALVE(S) ETC LEADS — CONNECT TO POWER TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR.

*MAY BE FIELD CONNECTED TO SEPARATE VOLTAGE SOURCE.

2

052-0351-00-3

Wiring Diagram



550/600 VOLT ACROSS THE LINE START-USING TWO CONTACTORS

(USE ALSO FOR 500 VOLT 50 CY.)

THE MOTOR THERMOSTATS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR CONTROL CIRCUIT ONLY--RESISTANCE OF THIS CIRCUIT IS _______________ OHMS ± 5%.

CONTROL VOLTAGE	A.C. AMPERES	MAXIMUM FUSE AMPS.
24+	4.0	5
110+	3.0	4
220	1.5	2

ABOVE 250V. STEPDOWN TRANSFORMER MUST BE USED.

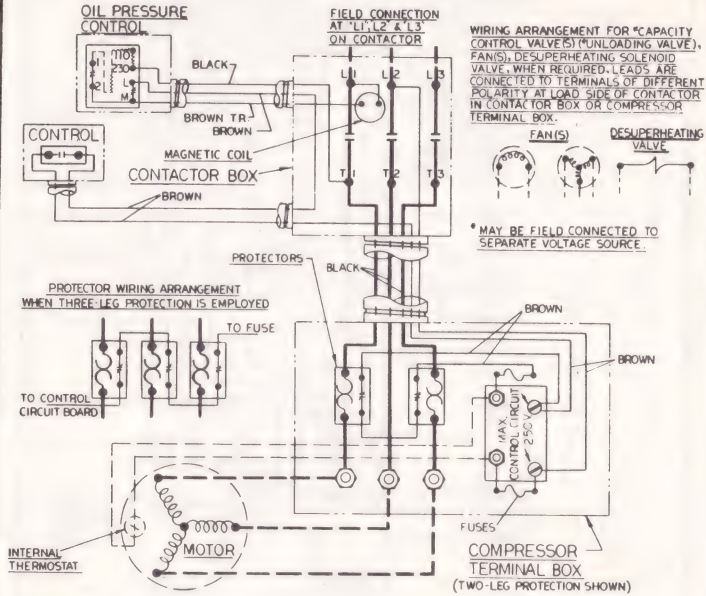
+AVAILABLE UPON SPECIAL REQUEST

WARNING

WARRANTY IS VOIDED IF PROTECTORS OR FUSES OTHER THAN THOSE APPROVED BY COPELAND ARE USED.

A BLOWN FUSE OR TRIPPED PROTECTOR INDICATES EITHER A SHORT, GROUND OR OVERLOAD--WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

No. 351



W A R N I N G

WARRANTY IS VOIDED IF PROTECTORS OR FUSES OTHER THAN APPROVED BY COPELAND ARE USED. A BLOWN FUSE INDICATES EITHER A SHORT, GROUND OR CONTROL CIRCUIT OVERLOAD ----- WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

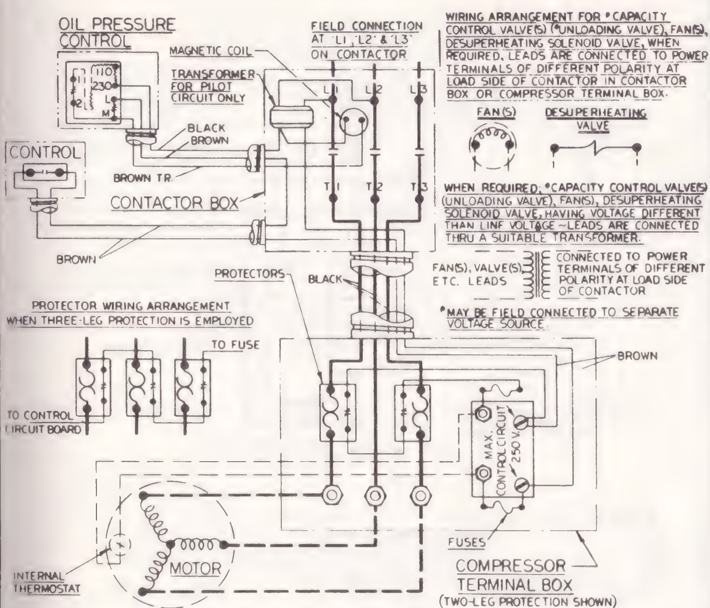
THE MOTOR THERMOSTATS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR CONTROL CIRCUIT ONLY -- RESISTANCE OF THIS CIRCUIT IS ____________ OHMS ±5%.

CONTROL VOLTAGE	A.C. AMPERES	MAXIMUM FUSE AMPS
24*	4.0	5
110	3.0	4
220	1.5	2

* AVAILABLE UPON SPECIAL REQUEST

052-0503-00

Wiring Diagram No. 503



WARNING

WARRANTY IS VOIDED IF PROTECTORS OR FUSES OTHER THAN APPROVED BY COPELAND ARE USED. A BLOWN FUSE INDICATES EITHER A SHORT, GROUND OR CONTROL CIRCUIT OVERLOAD ----- WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

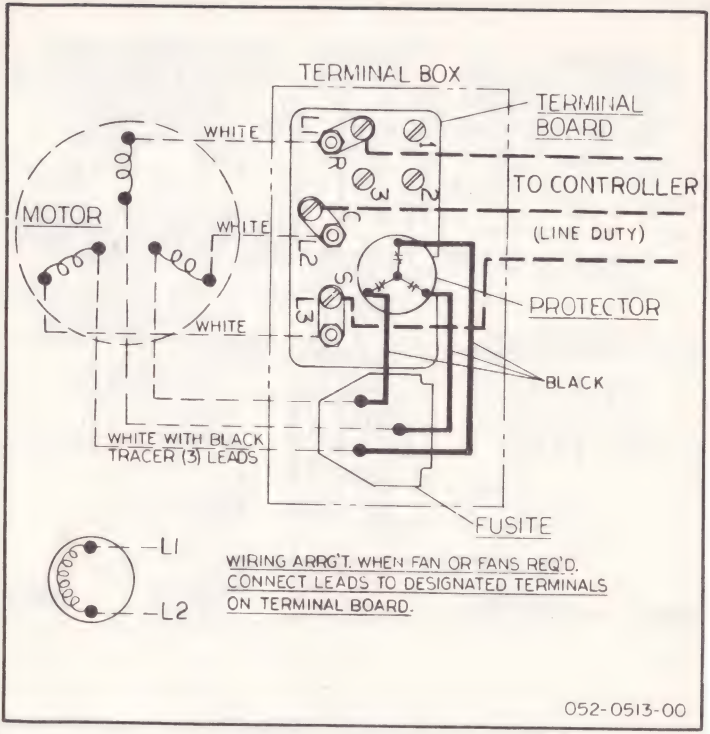
THE MOTOR THERMOSTATS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR CONTROL CIRCUIT ONLY -- RESISTANCE OF THIS CIRCUIT IS ______________ OHMS ±5%.

CONTROL VOLTAGE	A.C. AMPERES	MAXIMUM FUSE AMPS
24*	4.0	5
110	3.0	4
220	1.5	2

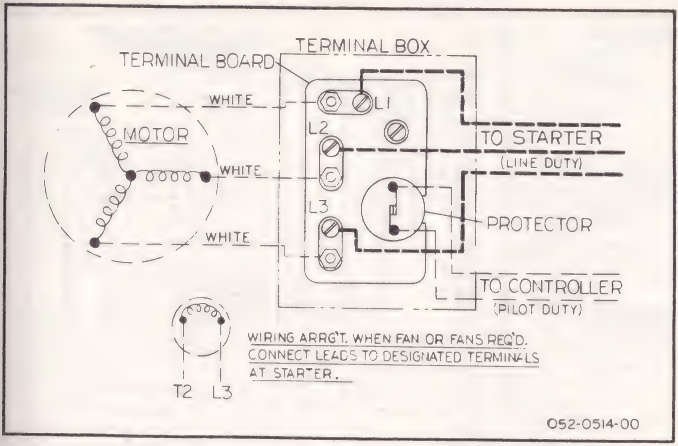
* AVAILABLE UPON SPECIAL REQUEST

052-0504-00

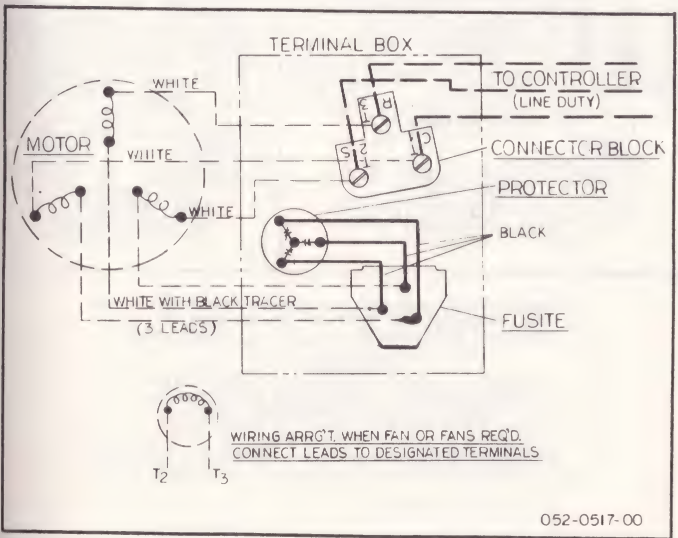
Wiring Diagram No. 504



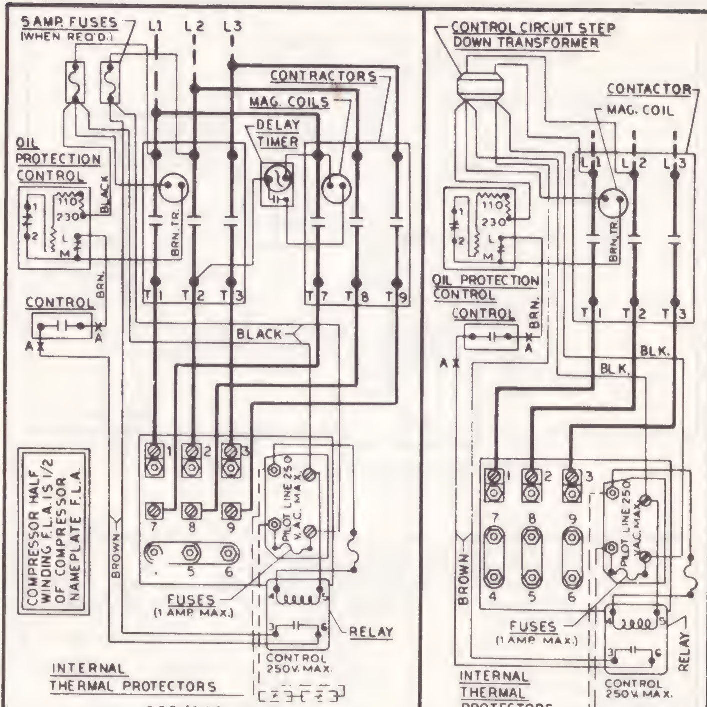
Wiring Diagram No. 513



Wiring Diagram No. 514



Wiring Diagram No. 517



208/240 VOLT PART WINDING START (USE ALSO FOR 200V. 50CY.)

440/480 VOLT ACROSS THE LINE (USE ALSO FOR 380V. 50CY.)

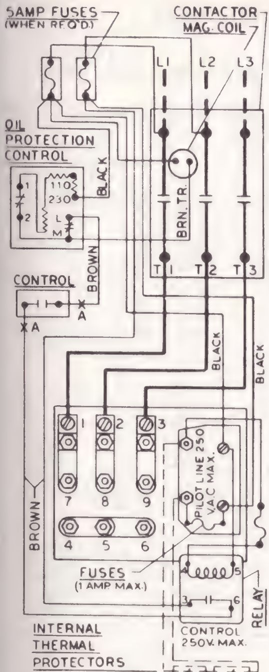
THE THERMAL PROTECTORS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR PILOT CIRCUIT ONLY; RESISTANCE OF THIS CIRCUIT IS ____________ OHMS ± 5%.

WARNING

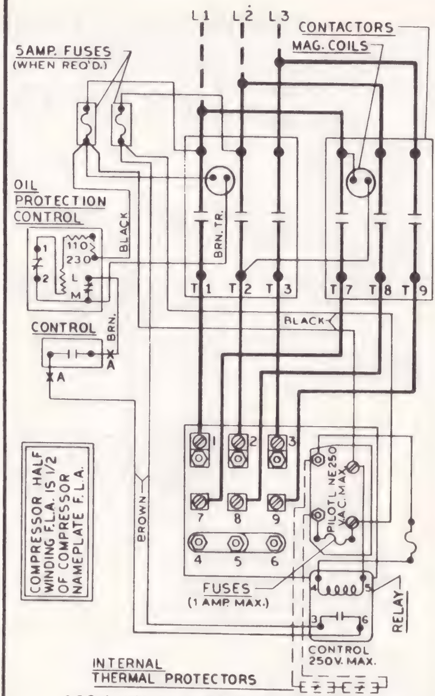
WARRANTY IS VOID IF FUSES LARGER THAN (1) AMP. MAX. ARE USED IN COMPRESSOR TERMINAL BOX. A BLOWN FUSE INDICATES EITHER A SHORT, GROUND OR PILOT CIRCUIT OVERLOAD, WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

3

Wiring Diagram No. 525

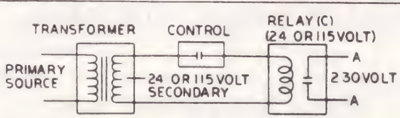


208/240 VOLT
ACROSS THE LINE
(USE ALSO FOR 200V. 50CY.)



208/240 VOLT ACROSS THE LINE
START-USING TWO CONTACTORS
(USE ALSO FOR 200V. 50CY.)

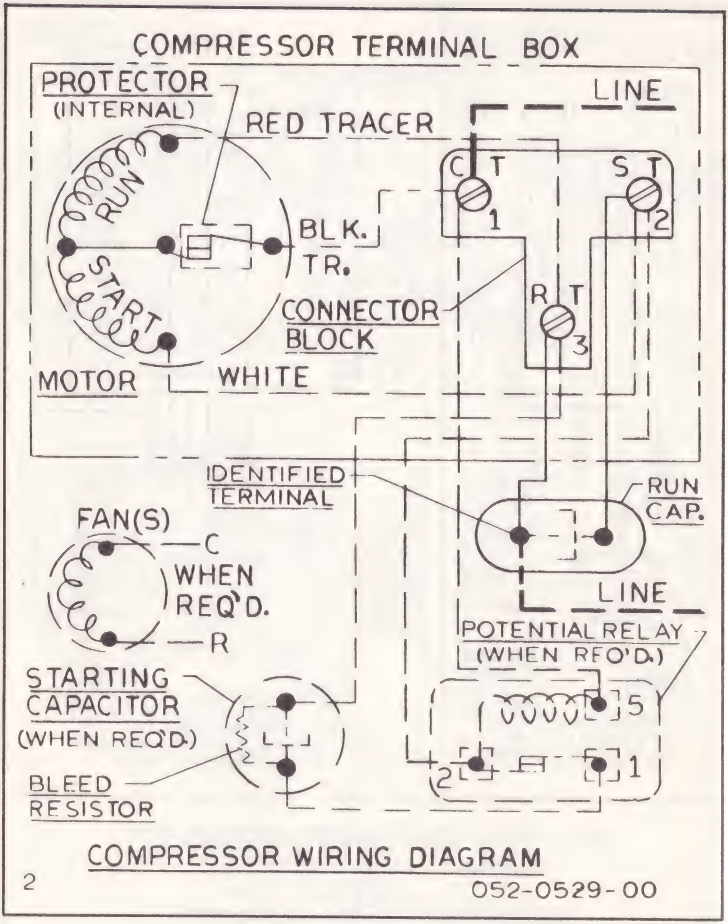
24VOLT OR 115VOLT CONTROL CIRCUIT MUST BE WIRED AS SHOWN:



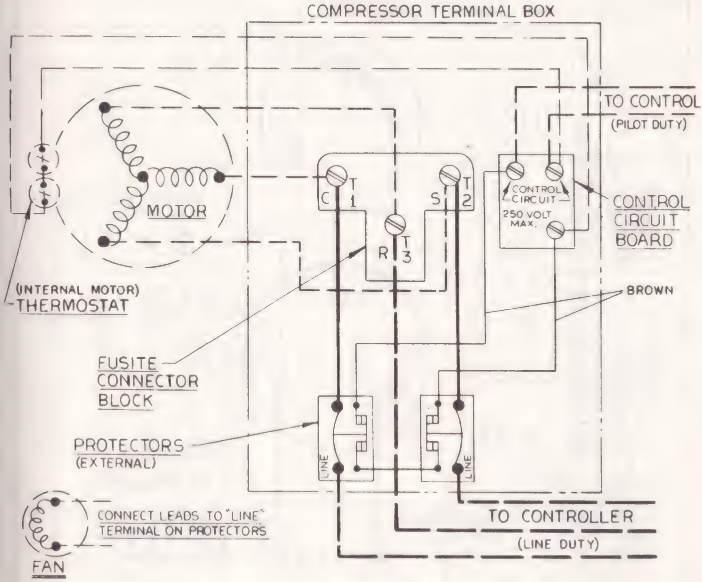
REMOVE CONTROL SHOWN ON APPROPRIATE WIRING DIAGRAM
ABOVE AND CONNECT LEADS FROM RELAY (C) TO POINTS A & A.

052-0525-00-3

Wiring Diagram No. 525



Wiring Diagram No. 529

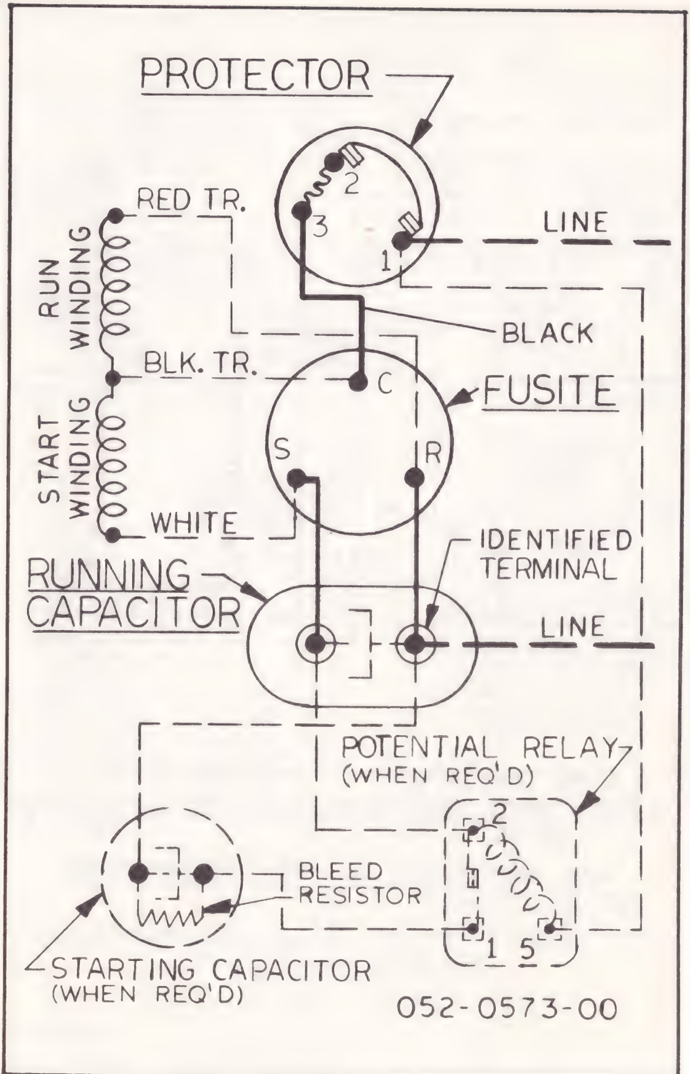


THE MOTOR THERMOSTATS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR CONTROL CIRCUIT ONLY — RESISTANCE OF THIS CIRCUIT INCLUDING EXTERNAL PROTECTORS IS __________ OHMS ±5%

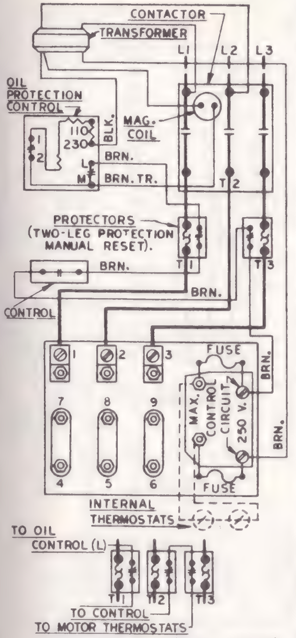
CONTROL VOLTAGE	A.C. AMPERES	MAXIMUM FUSE AMPS.
24	4.0	5
110	3.0	4
220	1.5	2
380/440	STEPDOWN TRANSFORMER MUST BE USED	

052-0553-00

Wiring Diagram No. 553

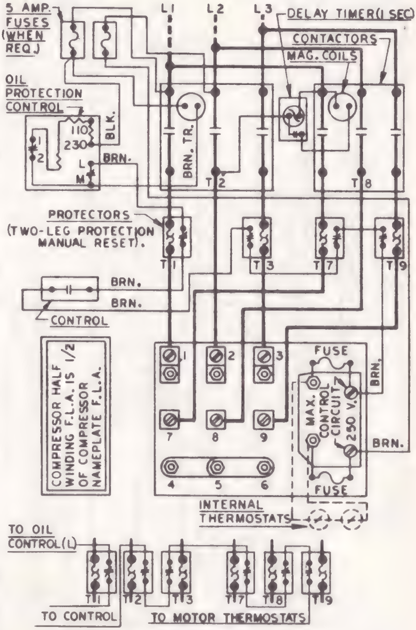


Wiring Diagram No. 573



PROTECTOR WIRING ARRANGEMENT
WHEN THREE-LEG PROTECTION IS EMPLOYED.

440/480 VOLT
ACROSS THE LINE
(USE ALSO FOR 380 VOLT 50 CY.)



PROTECTOR WIRING ARRANGEMENT
WHEN THREE-LEG PROTECTION IS EMPLOYED.

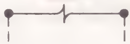
208/240 VOLT
PART WINDING START
(USE ALSO FOR 200 VOLT 50 CY.)

WIRING ARRANGEMENT FOR *CAPACITY CONTROL VALVE (S), FAN(S), DESUPERHEATING SOLENOID VALVE, WHEN REQUIRED; LEADS ARE CONNECTED TO POWER TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR IN STARTER PANEL.

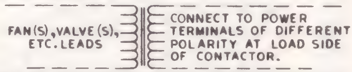
FAN (S)



DESUPERHEATING VALVE



WHEN REQUIRED; *CAPACITY CONTROL VALVE (S), FAN(S), DESUPERHEATING SOLENOID VALVE, HAVING VOLTAGE DIFFERENT THAN LINE VOLTAGE; CONNECT THRU A SUITABLE TRANSFORMER.

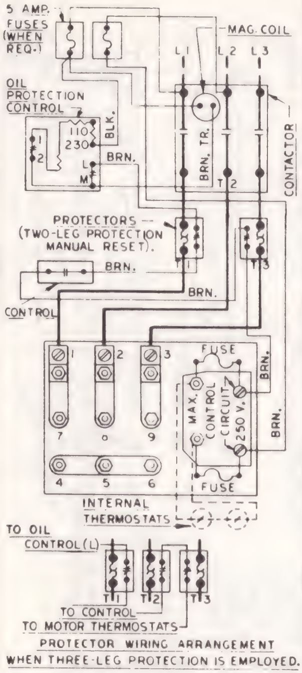


*MAY BE FIELD CONNECTED TO SEPARATE VOLTAGE SOURCE.

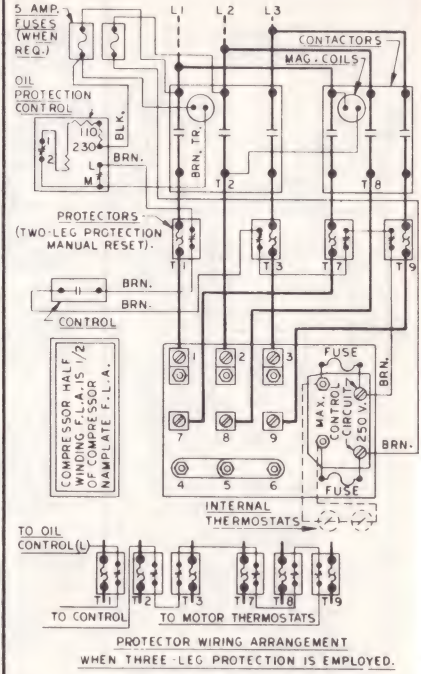
052-0580-00

6

Wiring Diagram No. 580



208/240 VOLT
ACROSS THE LINE
(USE ALSO FOR 200 VOLT 50 CY.)



208 / 240 VOLT ACROSS THE LINE
START-USING TWO CONTACTORS
(USE ALSO FOR 200 VOLT 50 CY.)

THE MOTOR THERMOSTATS CONNECTED TO THE TWO SMALL TERMINALS ARE FOR CONTROL CIRCUIT ONLY; RESISTANCE OF THIS CIRCUIT IS ______________ OHMS ± 5%.

CONTROL VOLTAGE	A. C. AMPERES	MAX. FUSE AMPS. (TERM. BOX)
24*	4.0	5
110*	3.0	4
220	1.5	2
380/440	STEPDOWN TRANSFORMER MUST BE USED.	

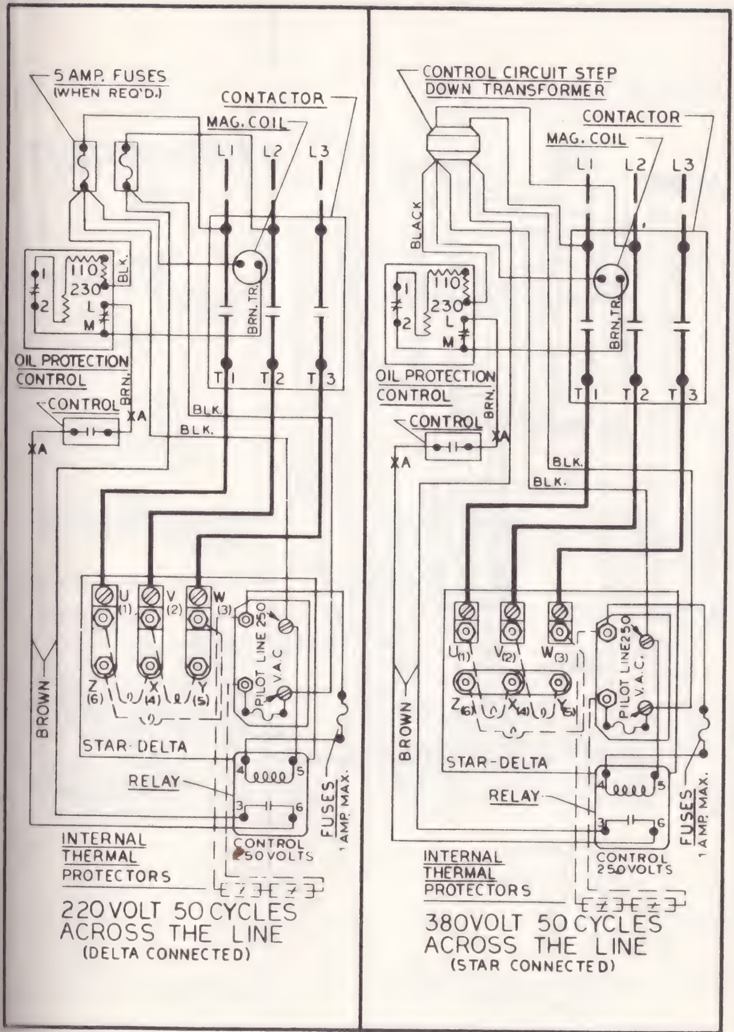
*AVAILABLE UPON SPECIAL REQUEST.

WARNING

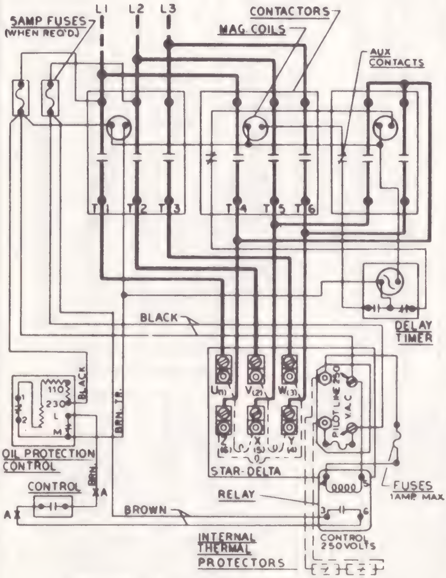
WARRANTY IS VOIDED IF PROTECTORS OR FUSES IN COMPRESSOR TERMINAL BOX OTHER THAN THOSE APPROVED BY COPELAND ARE USED.

A BLOWN FUSE OR TRIPPED PROTECTOR INDICATES EITHER A SHORT, GROUND, OR OVERLOAD — WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

Wiring Diagram No. 580

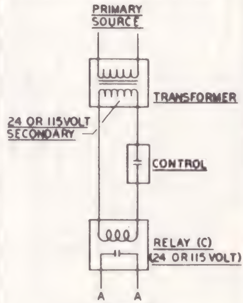


Wiring Diagram No. 591 (Part 1)



220 VOLT 50 CYCLES–STAR DELTA START
(STAR CONNECTED FOR STARTING & DELTA CONNECTED FOR RUNNING)

24 VOLT OR 115 VOLT CONTROL CIRCUIT MUST BE WIRED AS SHOWN BELOW



REMOVE CONTROL SHOWN ON APPROPRIATE WIRING DIAGRAM SHOWN AT LEFT AND CONNECT LEADS FROM RELAY (C) TO POINTS A & A

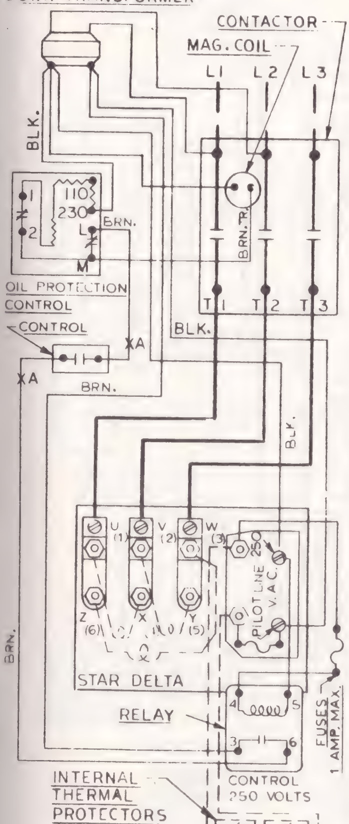


WIRING ARRANGEMENT FOR #CAPACITY CONTROL VALVE(S), FAN(S), DESUPER-HEATING SOLENOID VALVE, WHEN REQ'D; LEADS ARE CONNECTED TO POWER TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR OR THRU A SUITABLE TRANSFORMER.

FAN(S), VALVE(S), ETC, LEADS — CONNECT TO POWER TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR.

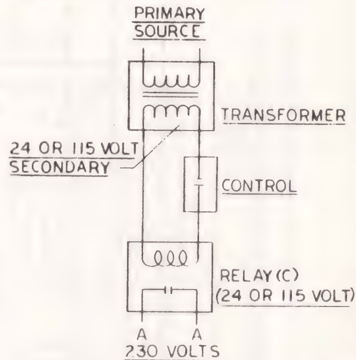
#MAY BE FIELD CONNECTED TO SEPARATE VOLTAGE SOURCE.

Wiring Diagram No. 591 (Part 2)

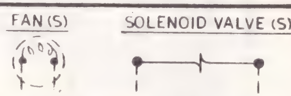


380 VOLT 50 CYCLE ACROSS THE LINE
(DELTA CONNECTED)

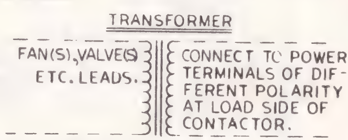
24 VOLT OR 115 VOLT CONTROL CIRCUIT MUST BE WIRED AS SHOWN BELOW.



REMOVE CONTROL SHOWN ON APPROPRIATE WIRING DIAGRAM SHOWN AT LEFT AND CONNECT LEADS FROM RELAY (C) TO POINTS A & A.

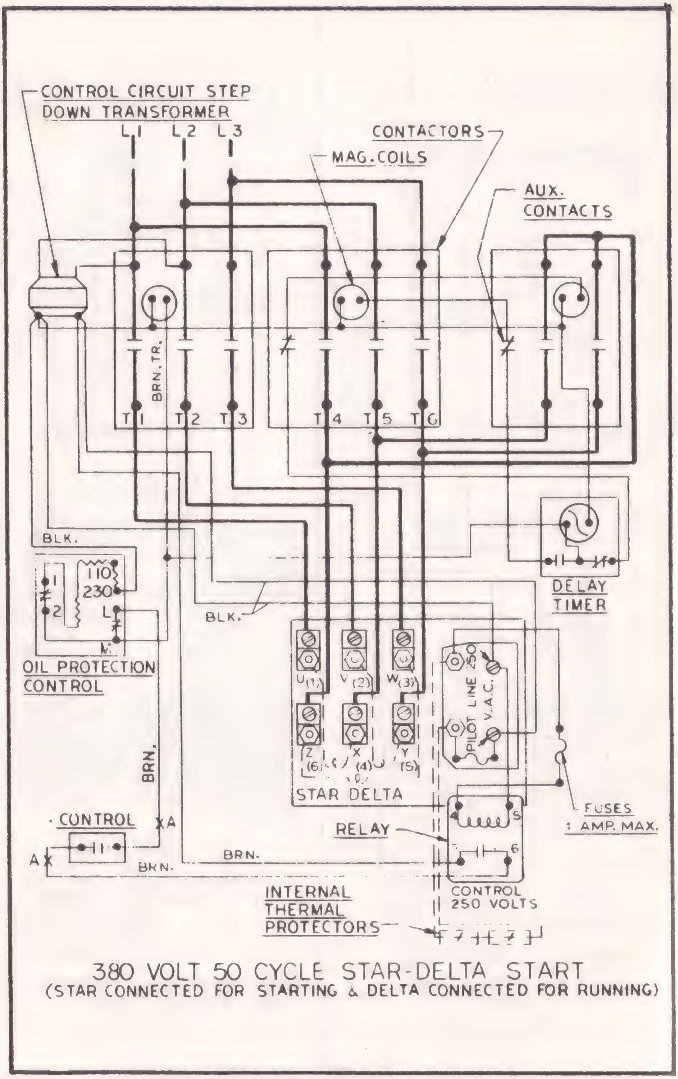


WIRING ARRANGEMENT FOR *CAPACITY CONTROL VALVE(S), FAN(S), DESUPERHEATING SOLENOID VALVE, WHEN REQ'D.; LEADS ARE CONNECTED TO POWER TERMINALS OF DIFFERENT POLARITY AT LOAD SIDE OF CONTACTOR OR THRU A SUITABLE TRANSFORMER.

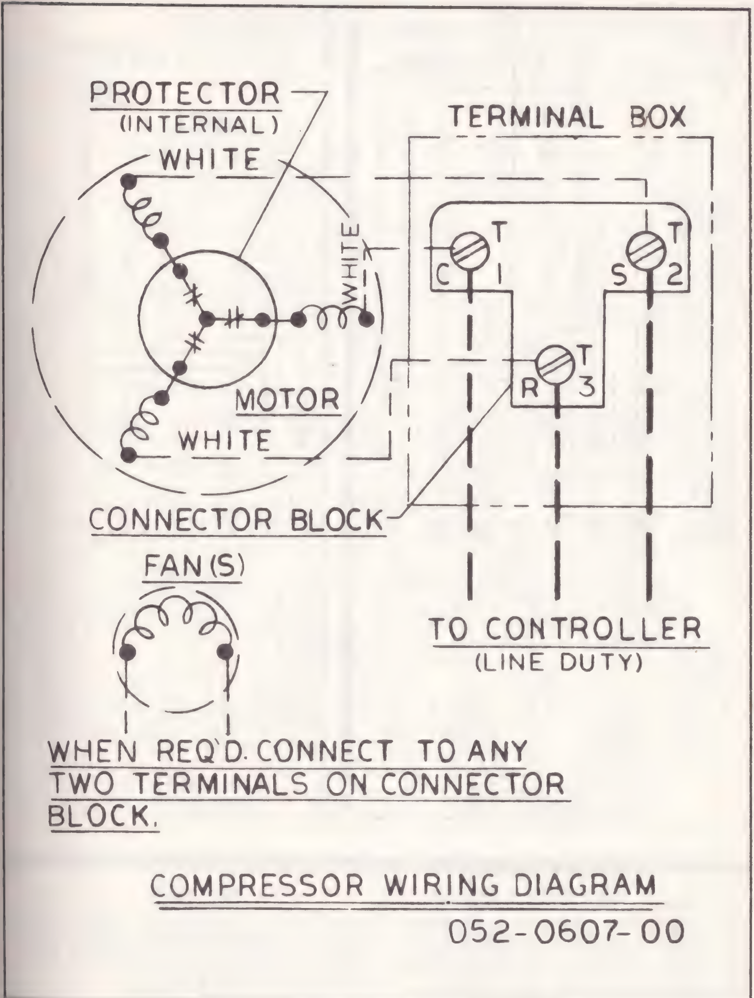


*MAY BE FIELD CONNECTED TO SEPARATE VOLTAGE SOURCE

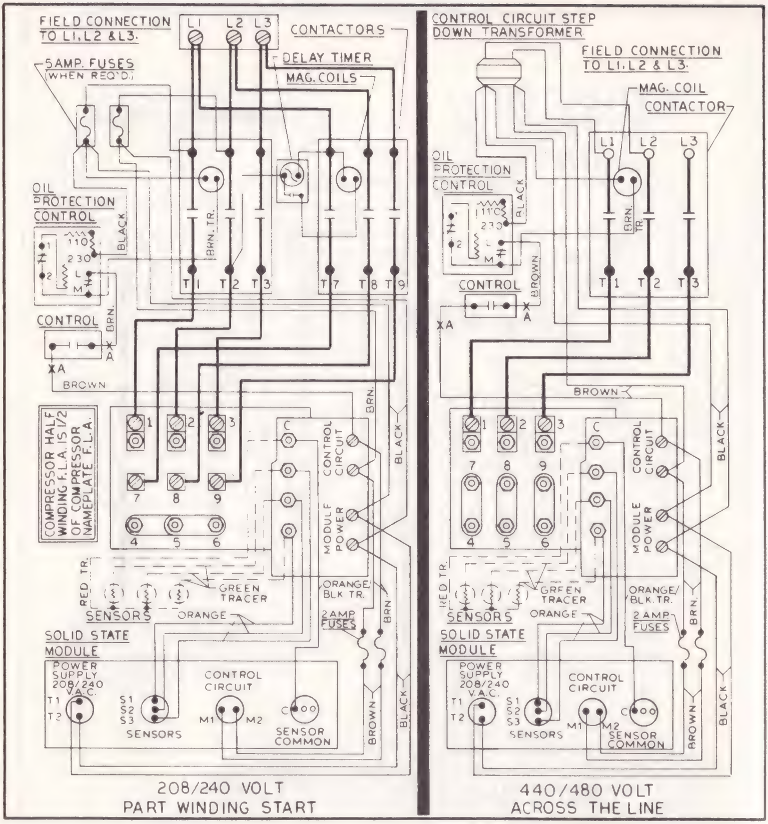
Wiring Diagram No. 594 (Part 1)



Wiring Diagram No. 594 (Part 2)



Wiring Diagram No. 607



WARNING—TO AVOID DAMAGE

USE OHMMETER ONLY (3 VOLT MAX.) TO CHECK SENSOR RESISTANCE. DO NOT SHORT ACROSS THE TERMINALS. RESISTANCE ACROSS EACH MOTOR SENSOR SHOULD BE APPROXIMATELY 75 OHMS (COLD) TO 125 OHMS (HOT) WITH SENSORS DISCONNECTED FROM MODULE.

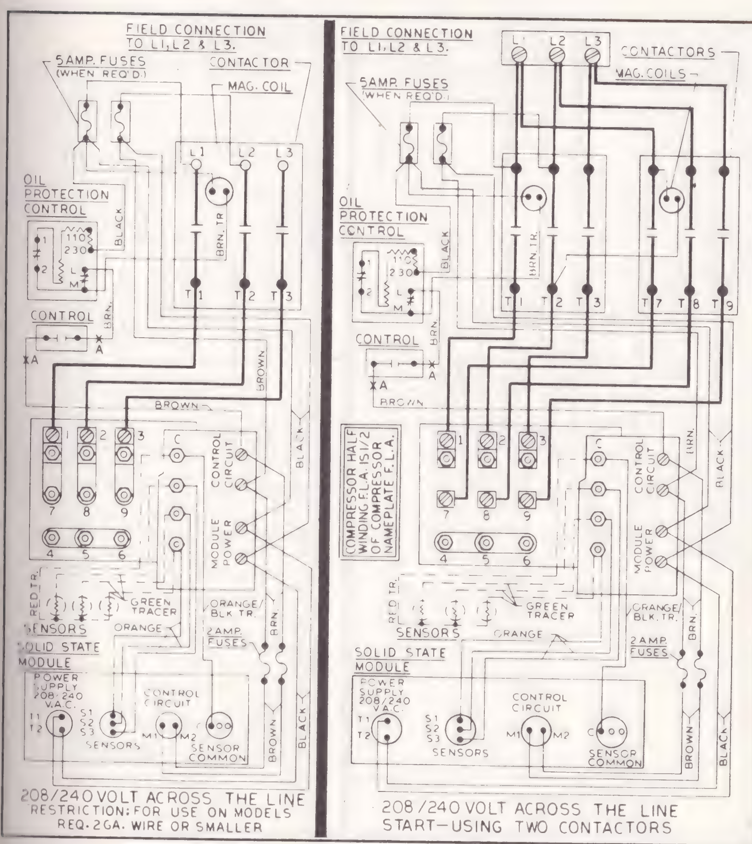
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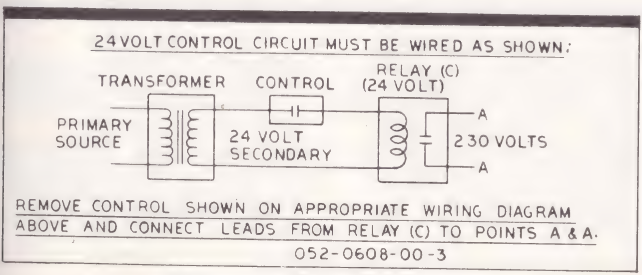
WARNING

WARRANTY IS VOIDED IF MODULE OR FUSES IN COMPRESSOR TERMINAL BOX OTHER THAN THOSE APPROVED BY COPELAND ARE USED.

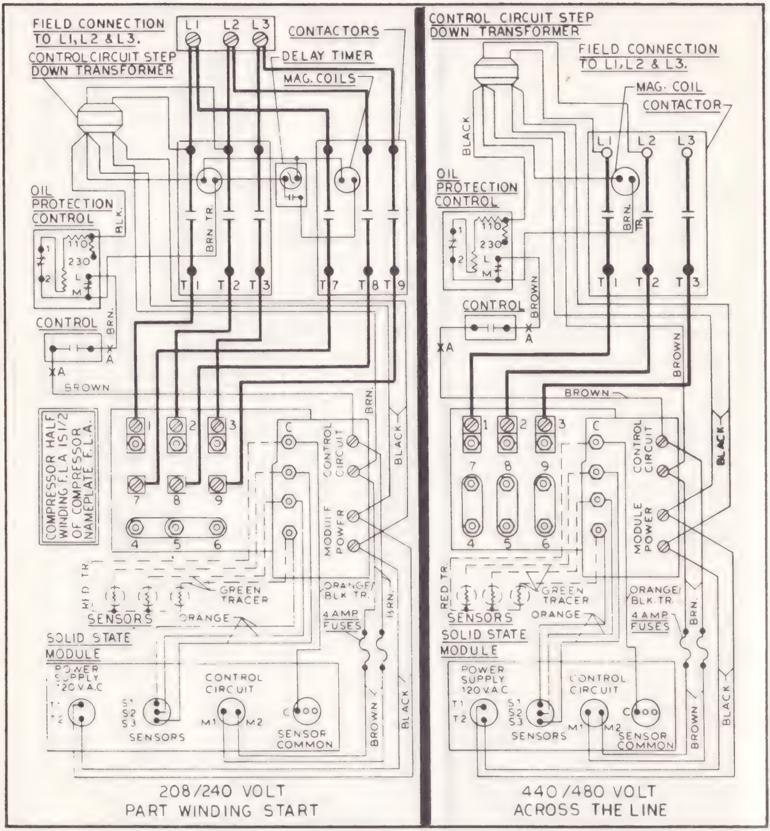
A BLOWN FUSE OR TRIPPED MODULE INDICATES EITHER A SHORT, GROUND OR OVERLOAD WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

Solid State Wiring Diagram #608
220 V. Robertshaw Control Circuit





Solid State Wiring Diagram #608
220 V. Robertshaw Control Circuit



WARNING—TO AVOID DAMAGE

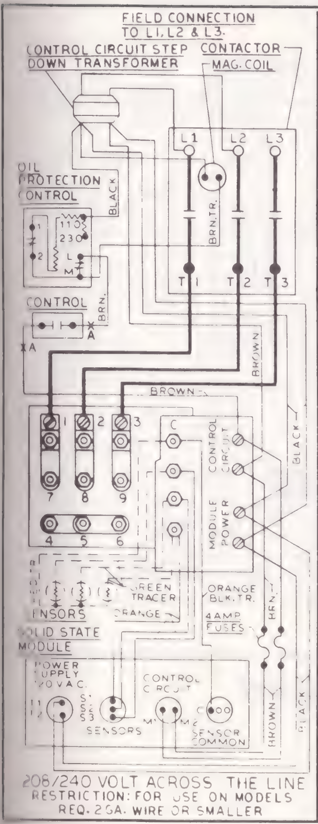
USE OHMMETER ONLY (3 VOLT MAX.) TO CHECK SENSOR RESISTANCE. DO NOT SHORT ACROSS THE TERMINALS. RESISTANCE ACROSS EACH MOTOR SENSOR SHOULD BE APPROXIMATELY 75 OHMS (COLD) TO 125 OHMS (HOT) WITH SENSORS DISCONNECTED FROM MODULE.

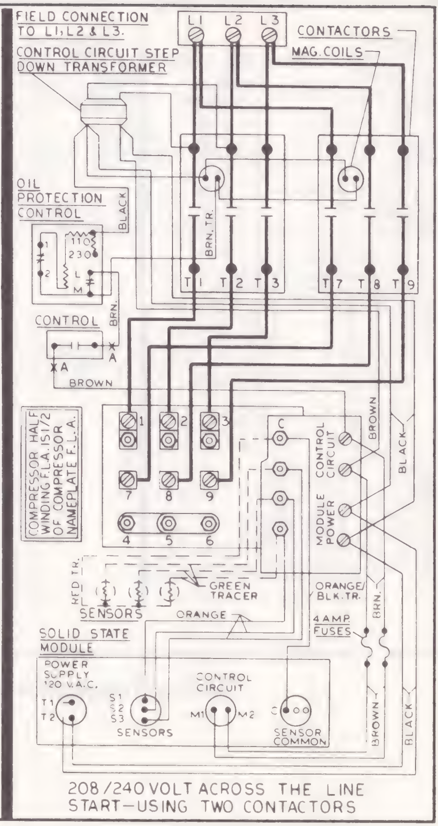
WARNING

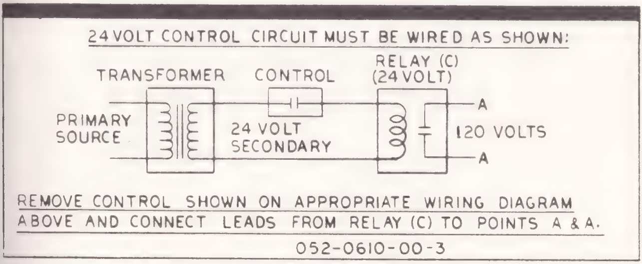
WARRANTY IS VOIDED IF MODULE OR FUSES IN COMPRESSOR TERMINAL BOX OTHER THAN THOSE APPROVED BY COPELAND ARE USED.

A BLOWN FUSE OR TRIPPED MODULE INDICATES EITHER A SHORT, GROUND OR OVERLOAD WHICH MUST BE FOUND AND CORRECTED BEFORE REPLACING FUSE OR STARTING MOTOR.

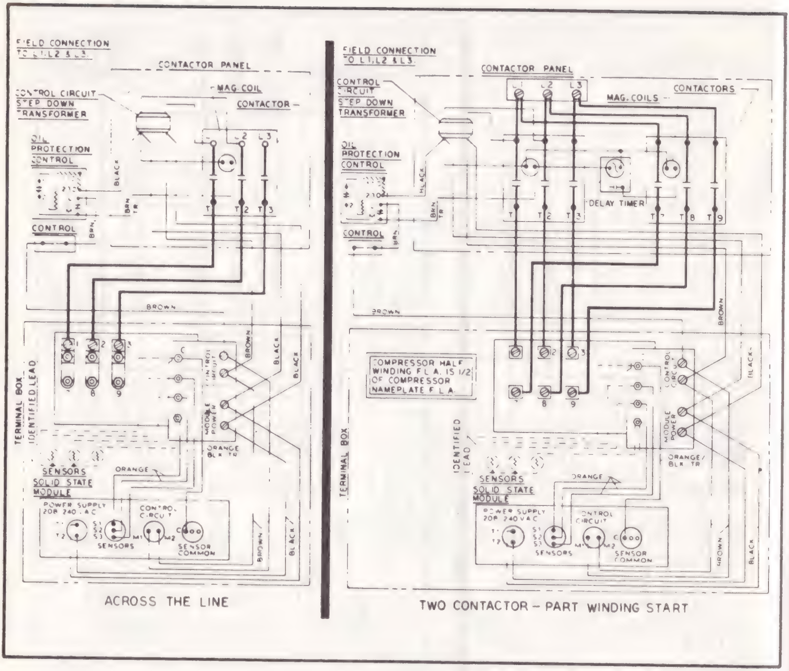
Solid State Wiring Diagram #610
120 V. Robertshaw Control Circuit



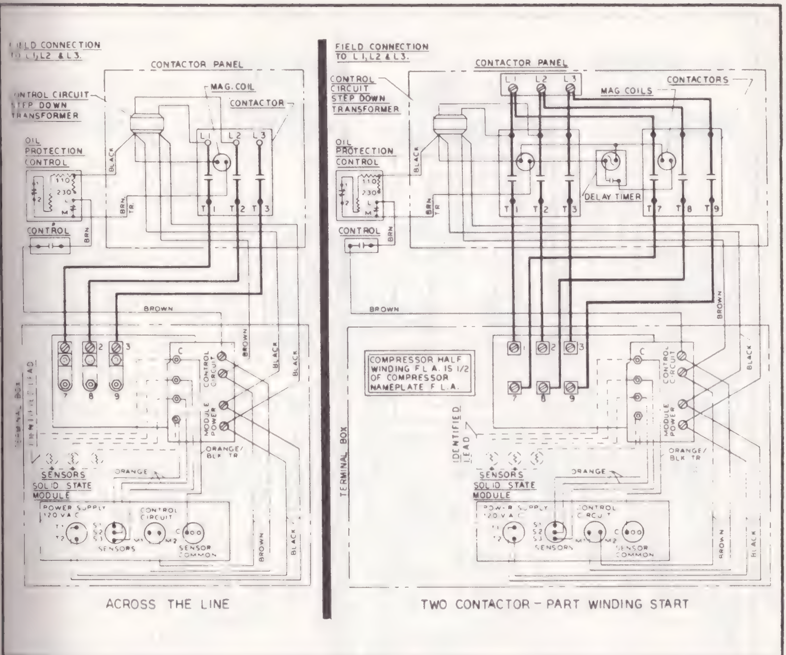




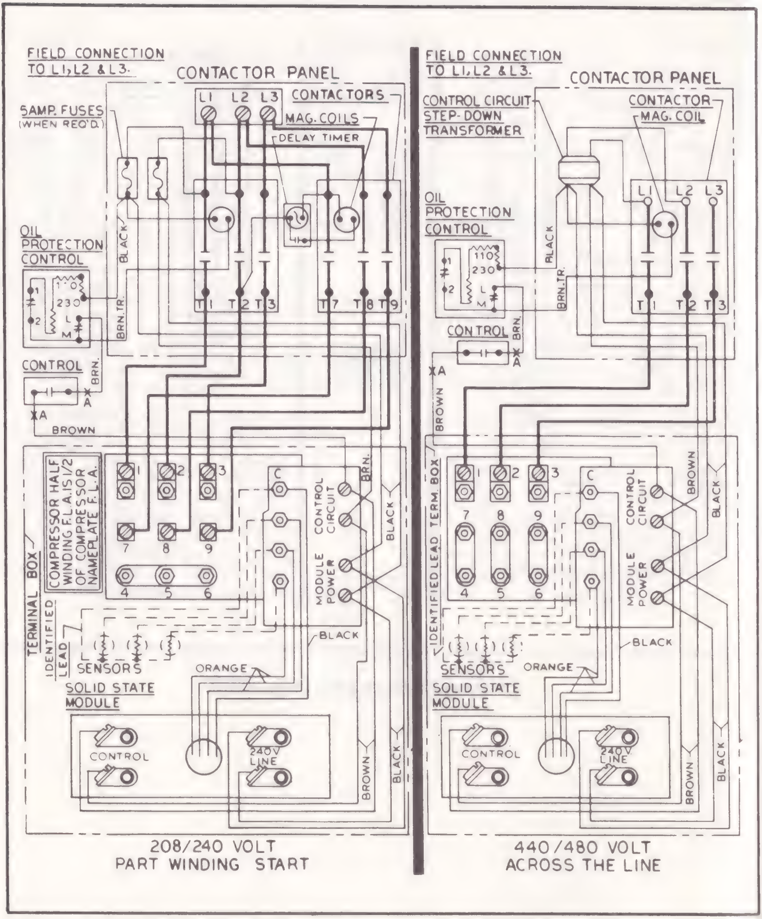
Solid State Wiring Diagram #610
120 V. Robertshaw Control Circuit



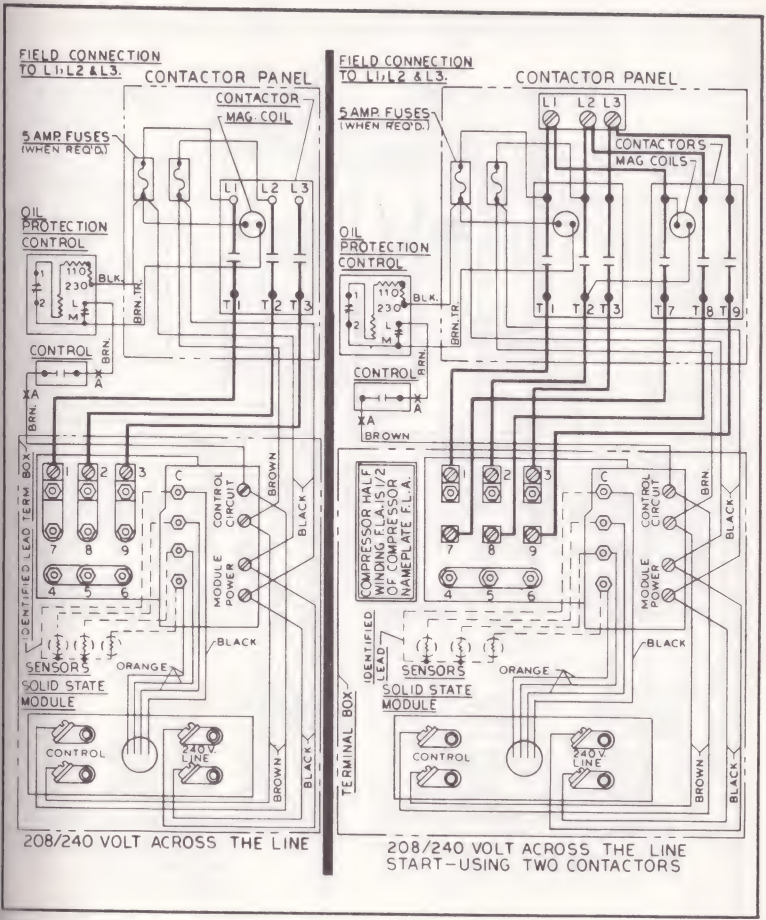
Wiring Diagram No. 612



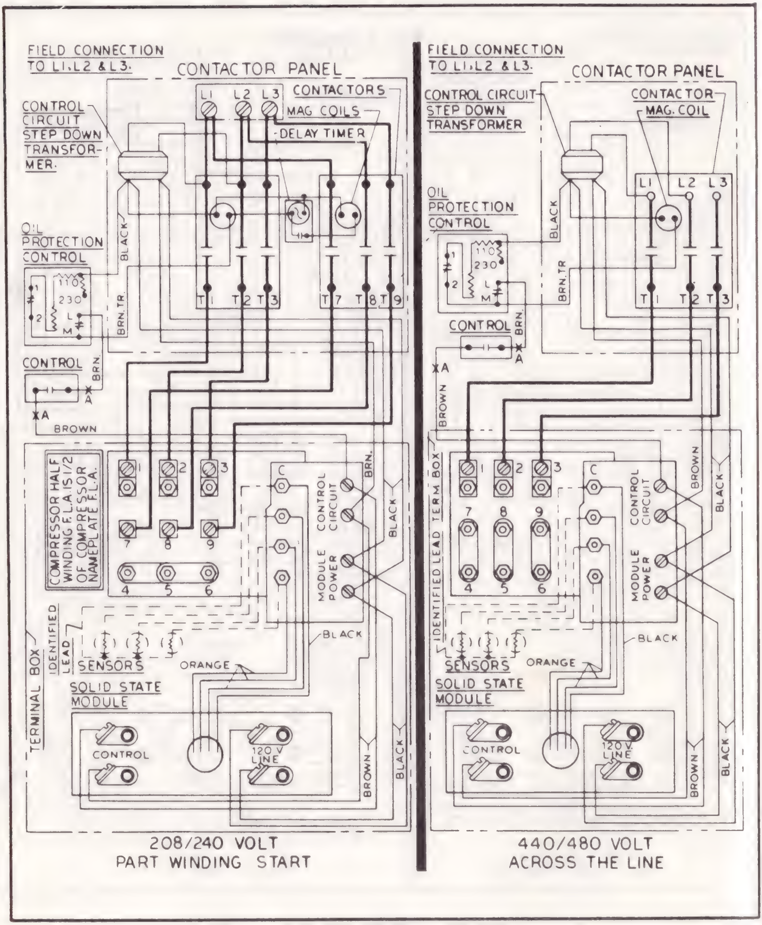
Wiring Diagram No. 613



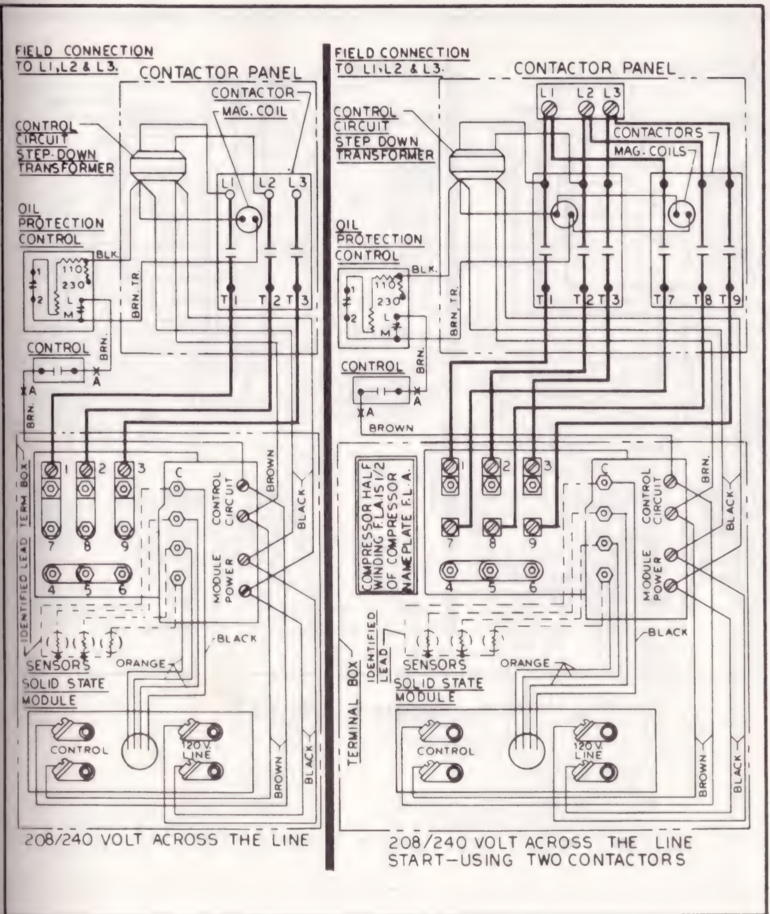
Wiring Diagram No. 616



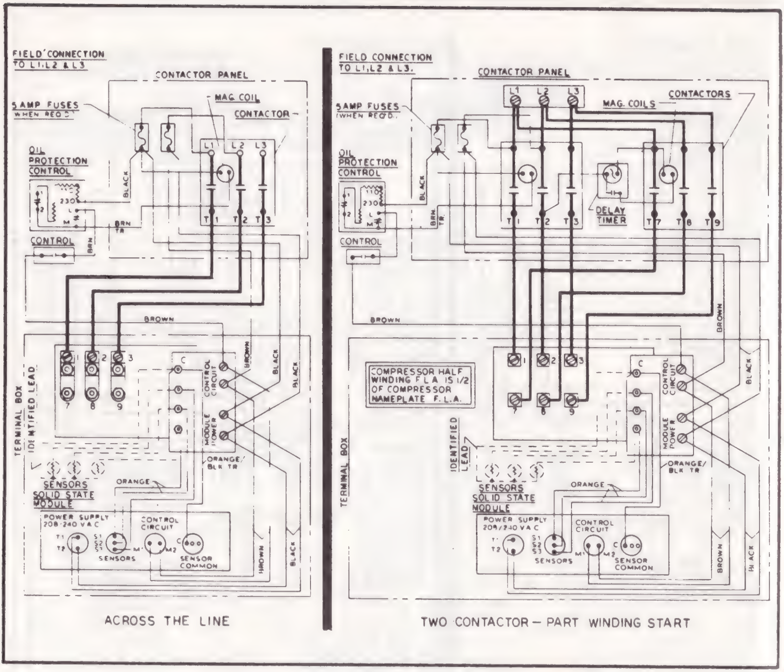
Wiring Diagram No. 616



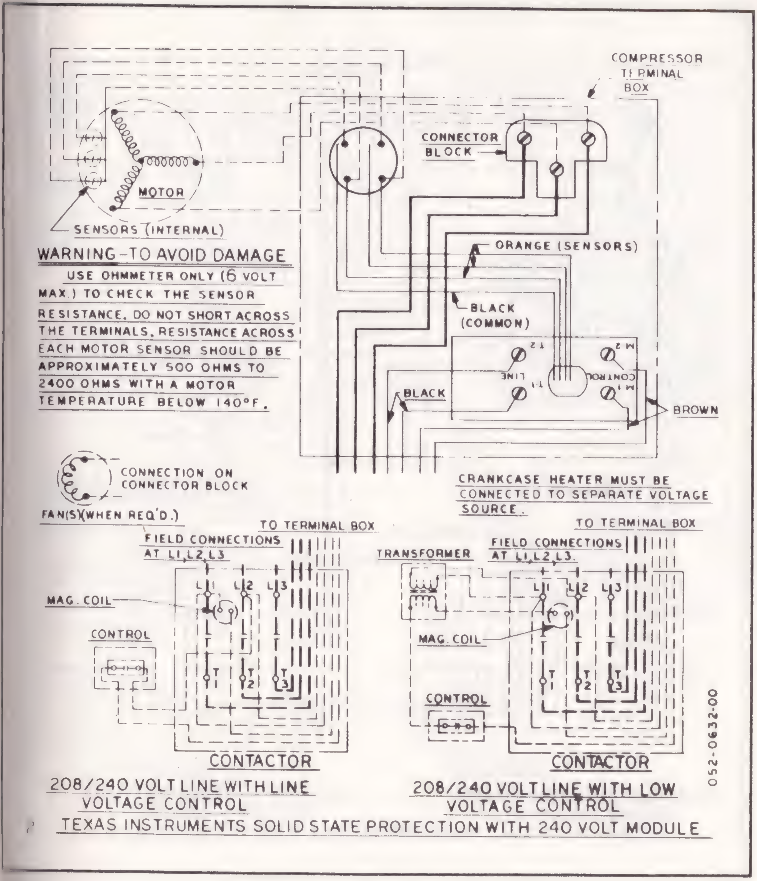
Wiring Diagram No. 618



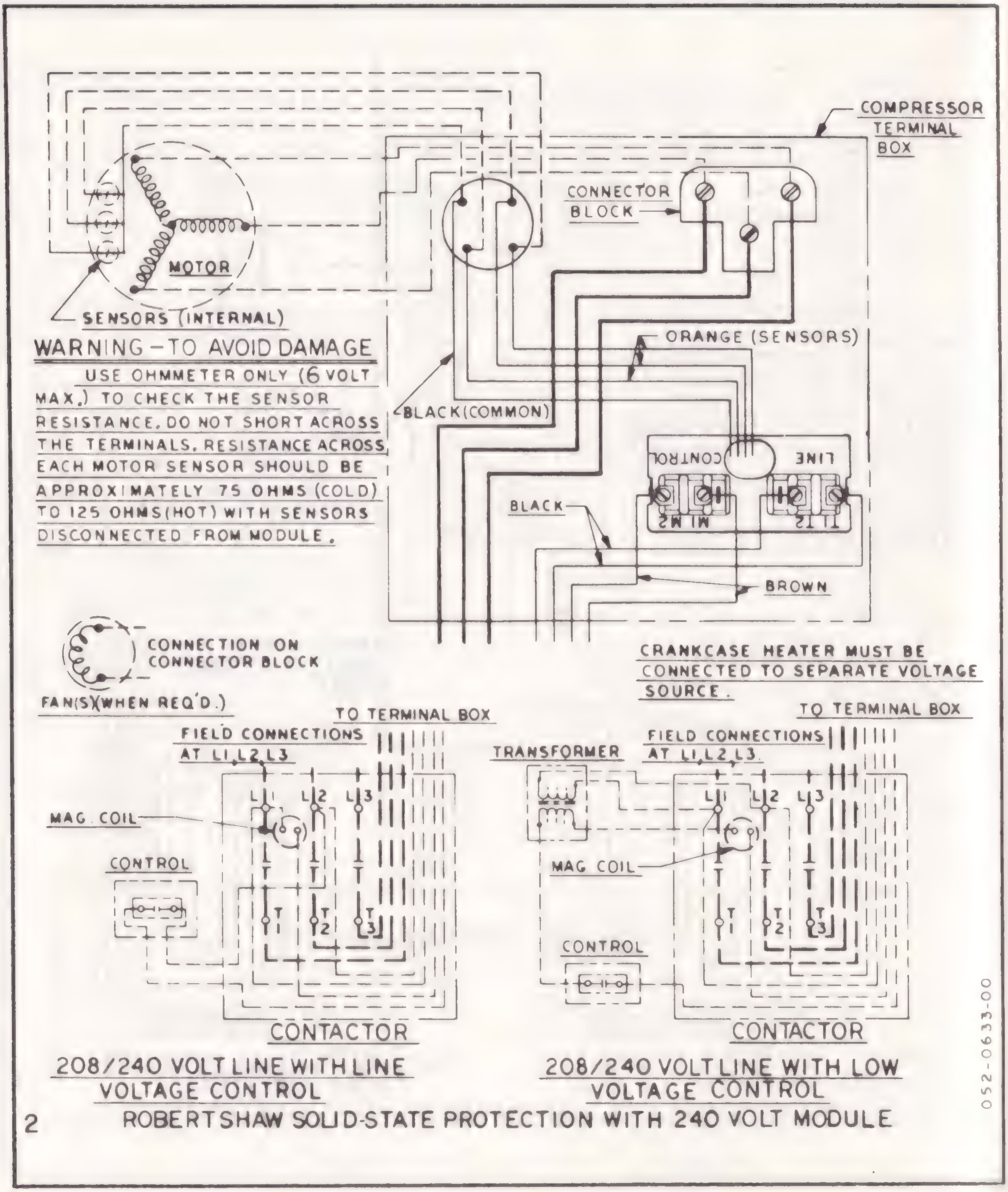
Wiring Diagram No. 618



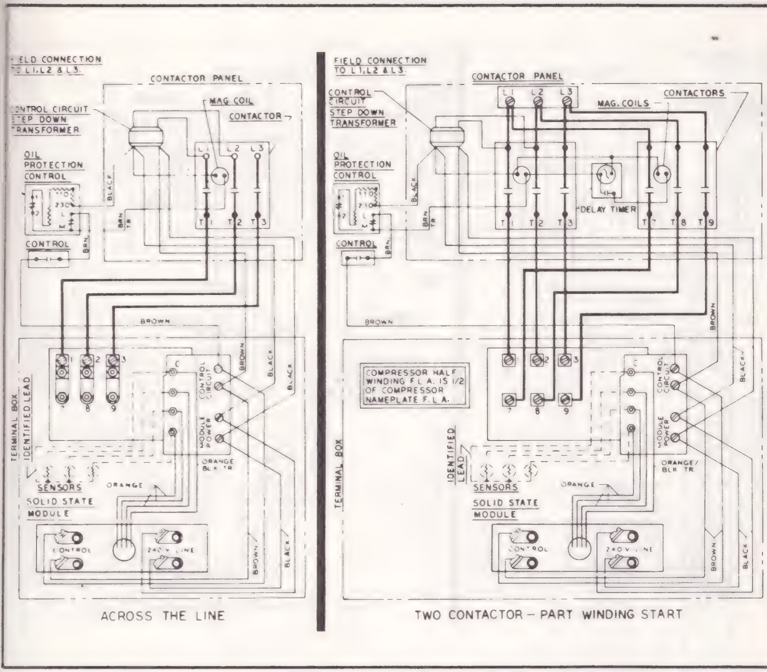
Wiring Diagram No. 622



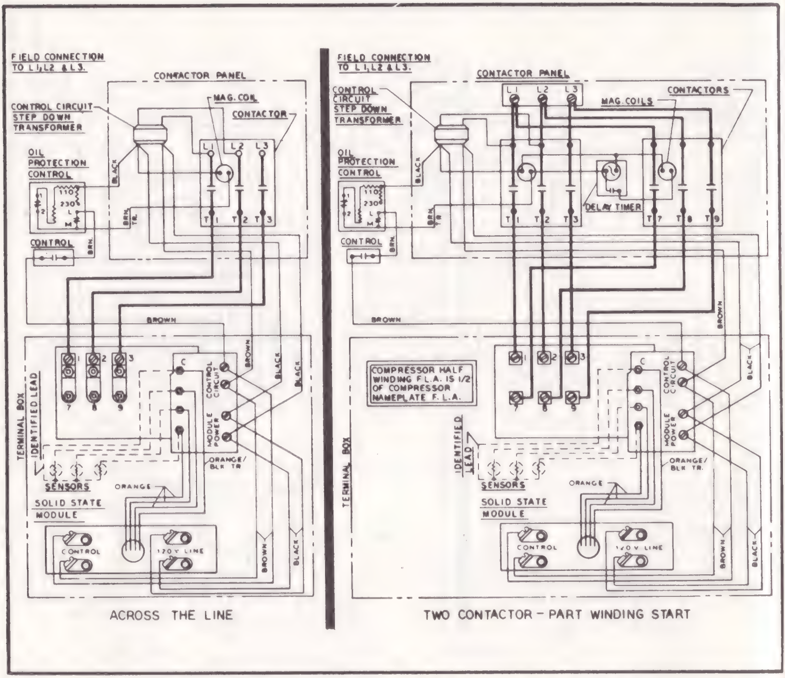
Wiring Diagram No. 632



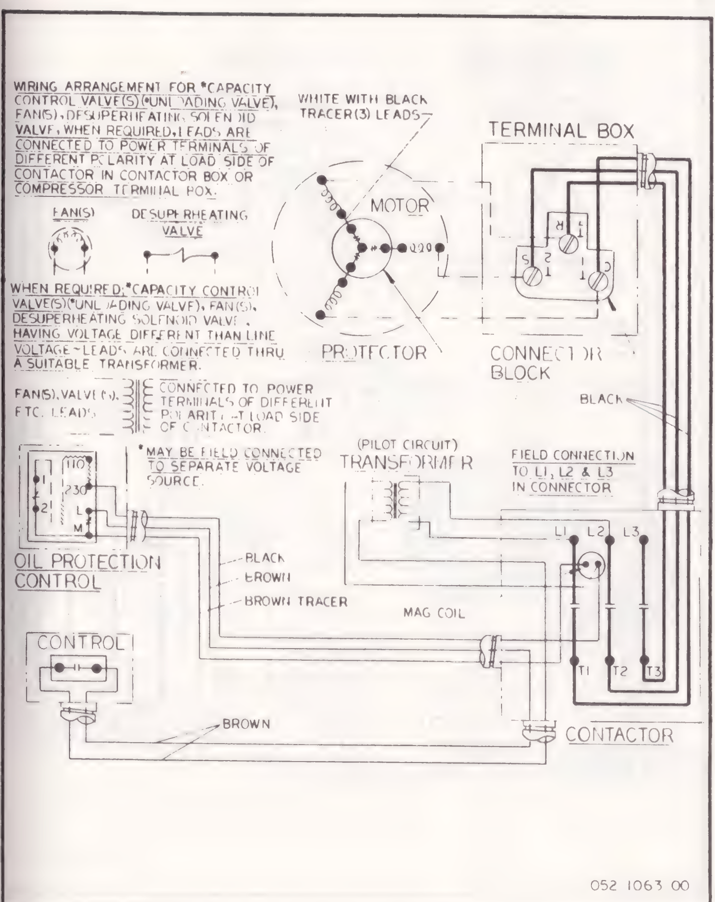
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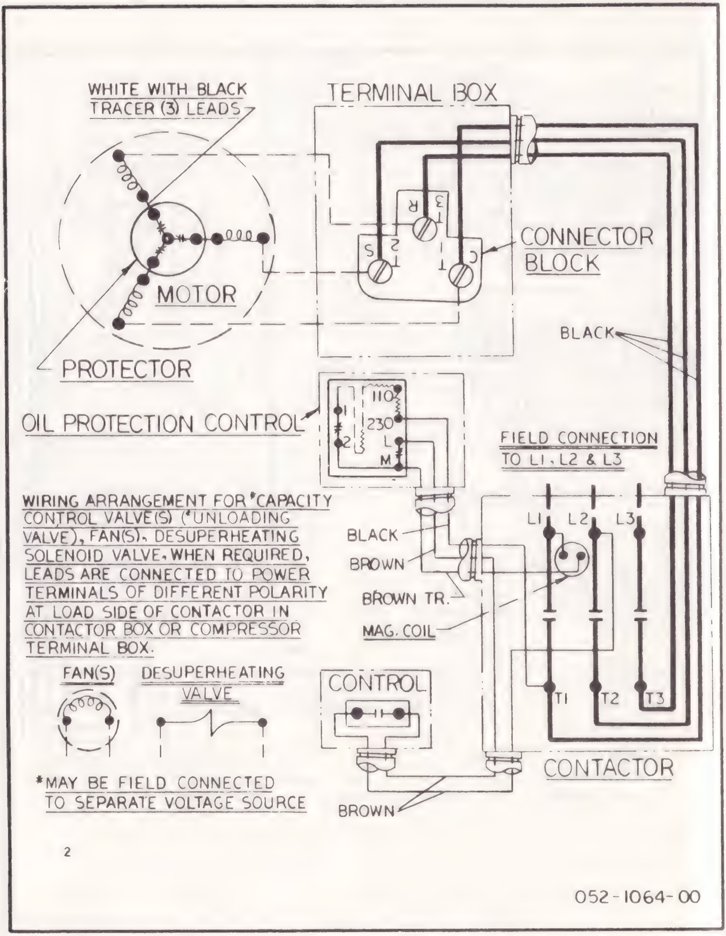
Wiring Diagram No. 635



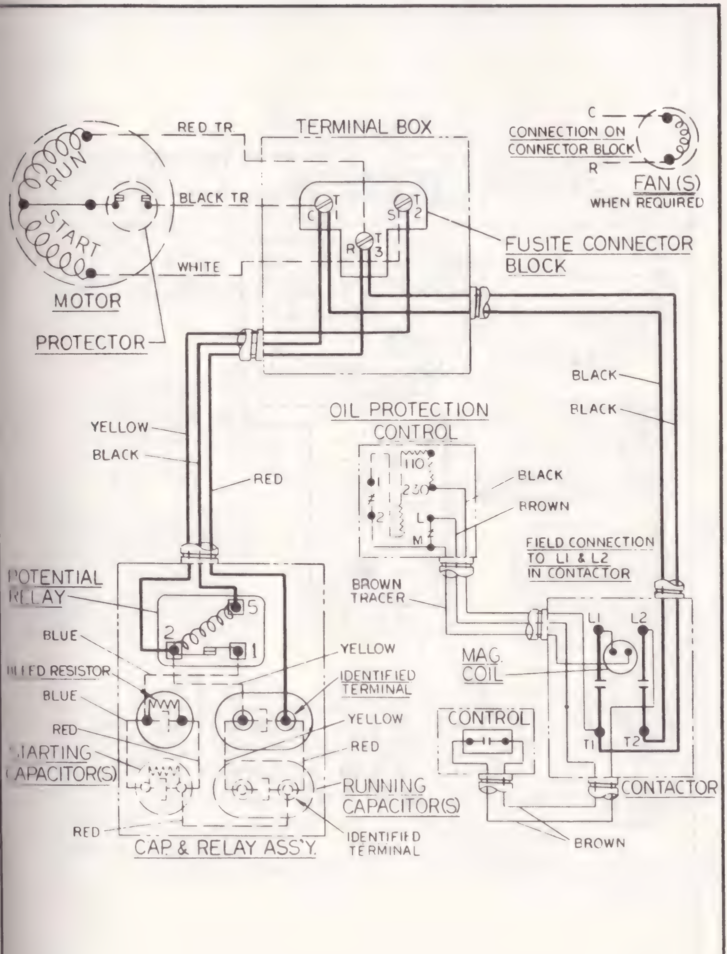
Wiring Diagram No. 636



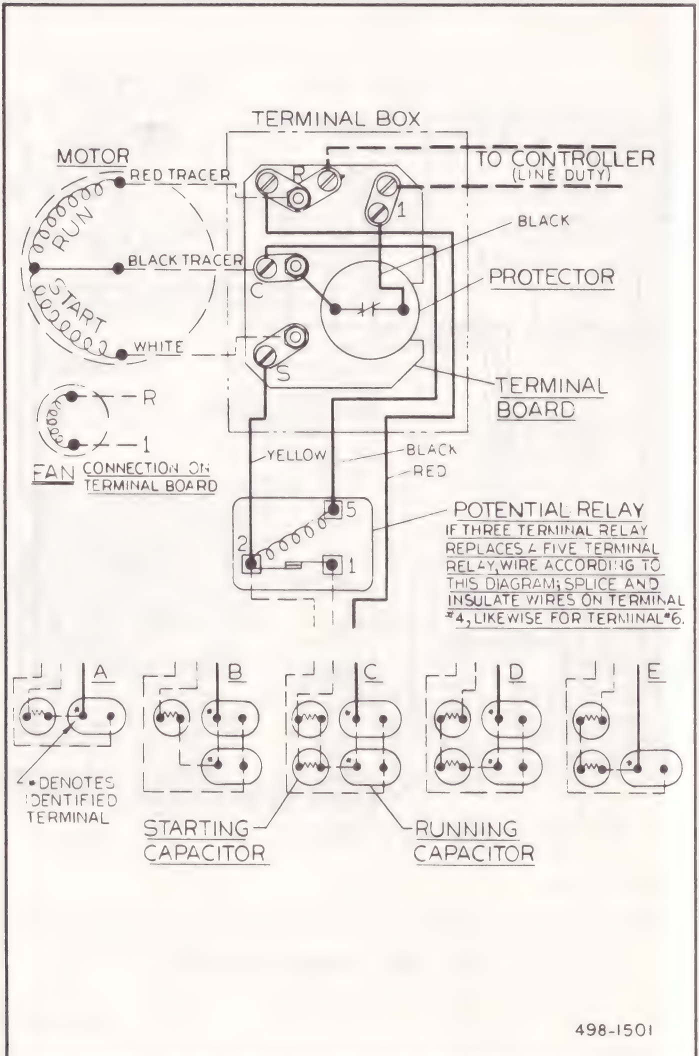
Wiring Diagram No. 1063



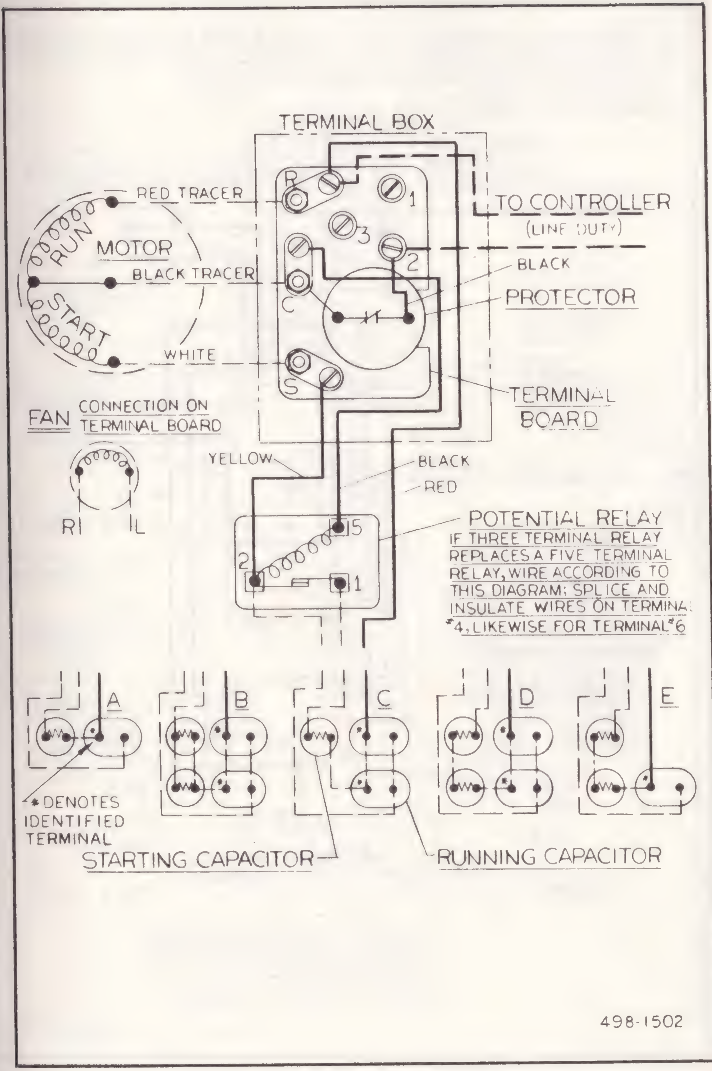
Wiring Diagram No. 1064



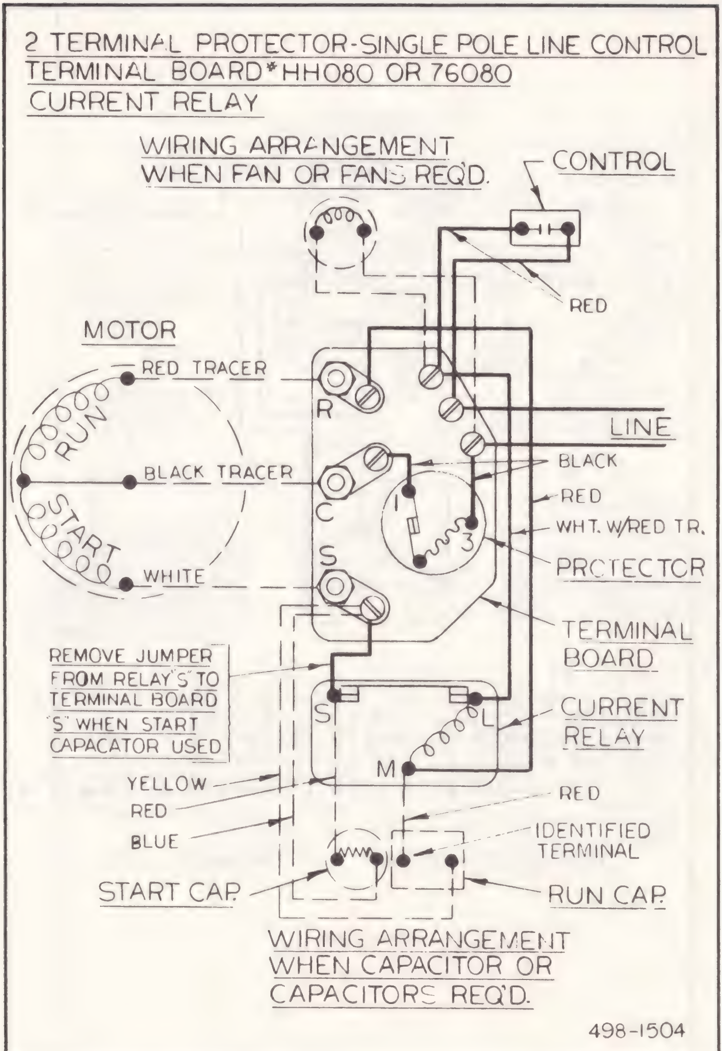
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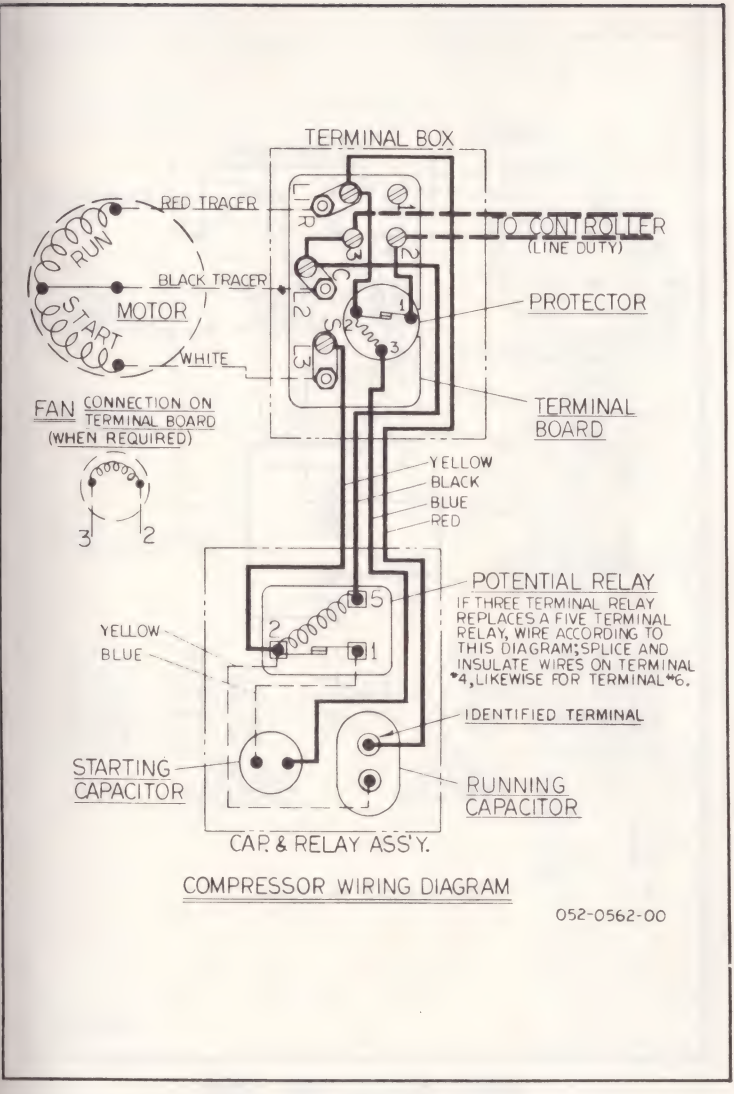
Wiring Diagram No. 1501



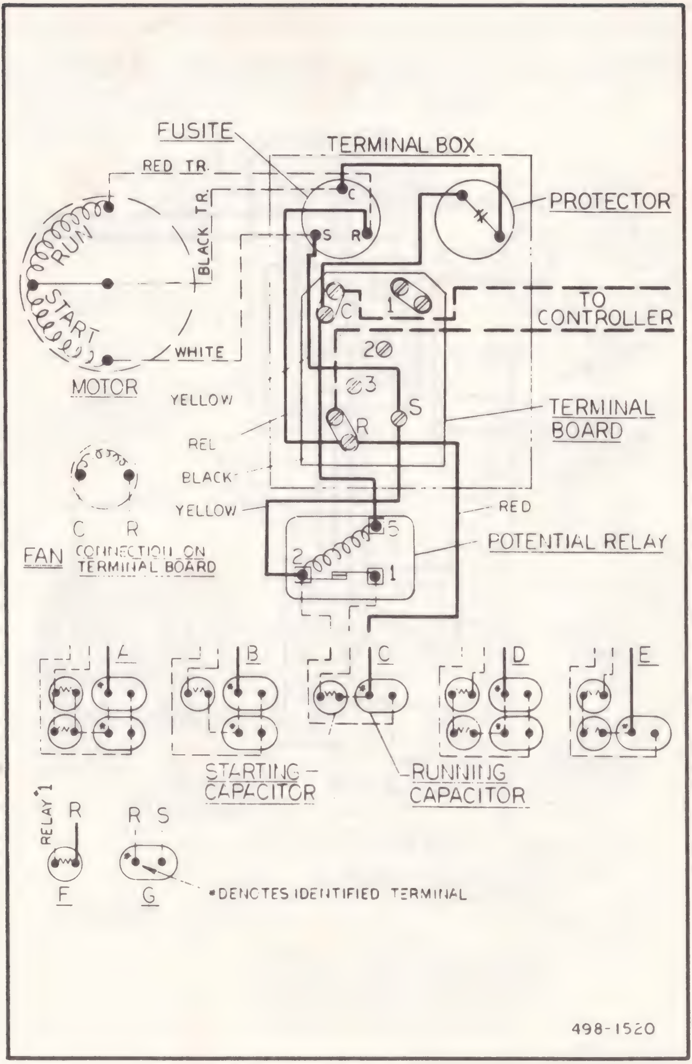
Wiring Diagram No. 1502



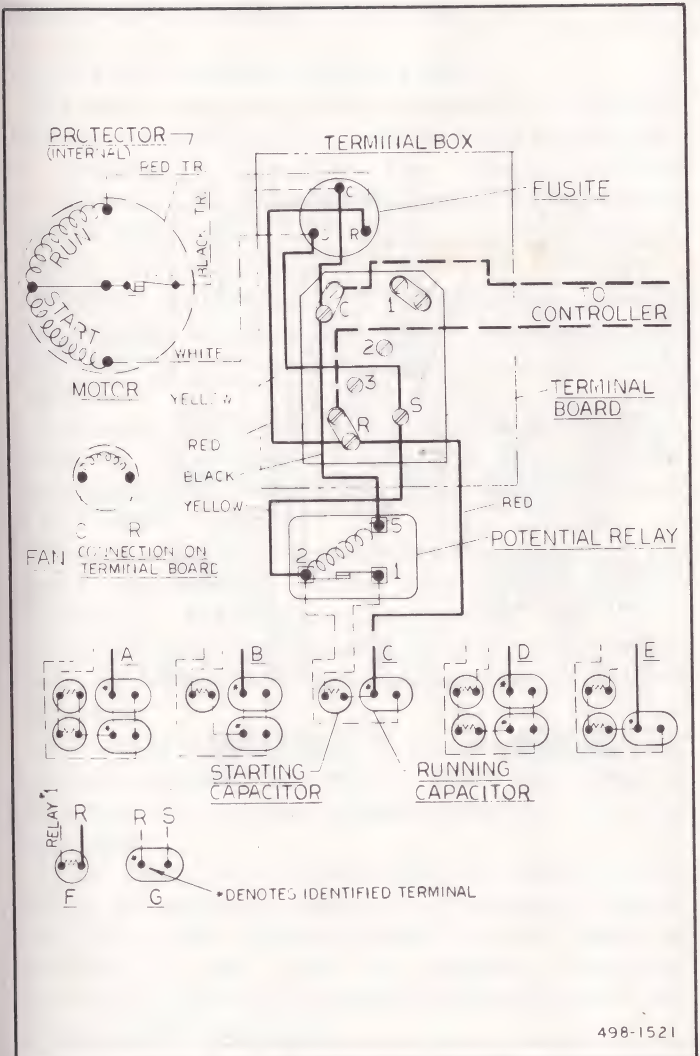
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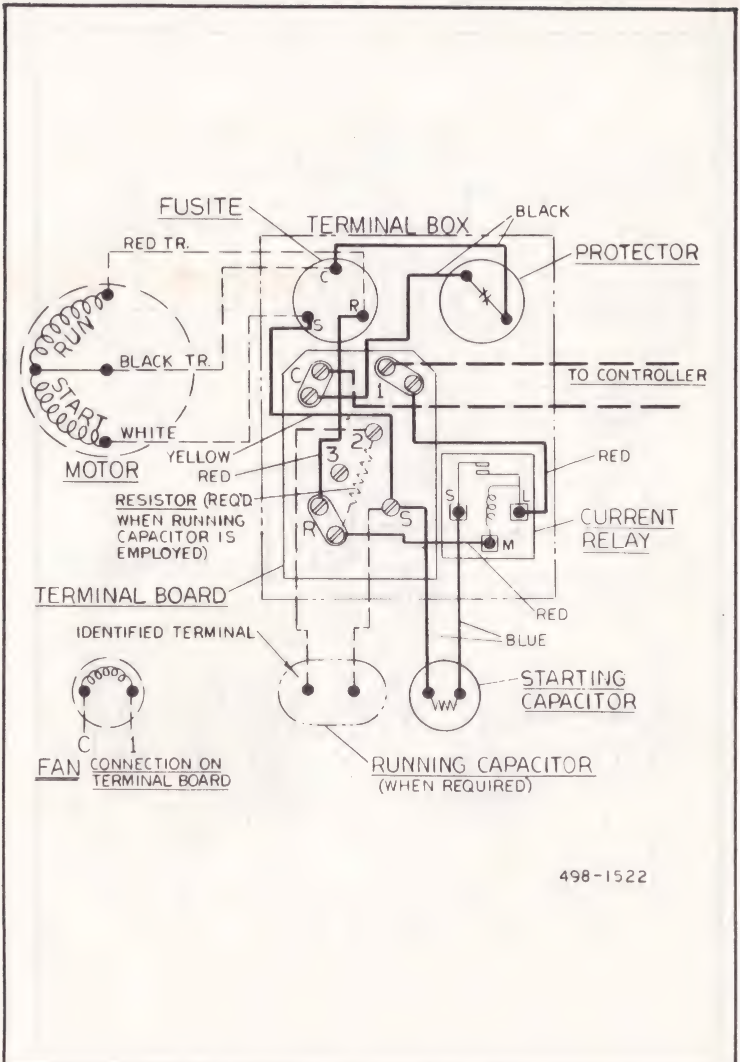
Wiring Diagram No. 1519



Wiring Diagram No. 1520



Wiring Diagram No. 1521



Wiring Diagram No. 1522

ELECTRICAL TROUBLE SHOOTING

(A) If The Compressor Will Not Run

If a motor compressor fails to start and run properly, it is important that the compressor be tested to determine its condition. It is possible that external electrical components may be defective, the protector may be open, a safety device may be tripped, or other conditions may be preventing compressor operation. If the motor compressor is not the source of the malfunction, replacing the compressor will only result in the unnecessary expenditure of time and money, while the basic problem remains.

1. If there is no voltage at the compressor terminals, follow the wiring diagram and check back from the compressor to the power supply to find where the circuit is interrupted.

Check the controls to see if the contact points are closed (low pressure control, high pressure control, thermostat, oil pressure safety control, etc.). If a contactor is used check to see if the contacts are closed. Check for a blown fuse, open disconnect switch, or loose connection.

2. If power is available at the compressor terminals, and the compressor does not run, check the voltage at the compressor terminals while attempting to start the compressor.

If the voltage at the compressor terminals is below 90% of the nameplate voltage, it is possible the motor may not develop sufficient torque to start. Check to determine if wire sizes are adequate, electrical connections are loose, the circuit is overloaded, or if the power supply is adequate.

3. On units with single phase PSC motors, the suction and discharge pressures must be equalized before

starting because of the low starting torque of the motor. Any change in the refrigerant metering device, the addition of a drier, or other changes in the system components may delay pressure equalization and create starting difficulties. If PSC motor starting problems are being encountered, the addition of a capacitor start kit is recommended.

4. On single phase compressors, a defective capacitor or relay may prevent the compressor starting. If the compressor attempts to start, but is unable to do so, or if there is a humming sound, check the relay to see if the relay contacts are damaged or fused. The relay points should be closed during the initial starting cycle, but should open as the compressor comes up to speed.

Remove the wires from the starting relay and capacitors. Use a high voltage ohmmeter to check for continuity through the relay coil. Replace the relay if there is no continuity. Use an ohmmeter to check across the relay contacts. Potential relay contacts are normally closed when the relay is not energized, current relay contacts are normally open. If either gives an incorrect reading, replace the relay.

Any capacitor found to be bulging, leaking, or damaged should be replaced.

Make sure capacitors are discharged before checking. Check for continuity between each capacitor terminal and the case. Continuity indicates a short, and the capacitor should be replaced.

Substitute "a known to be good" start capacitor if available. If compressor then starts and runs properly, replace the original start capacitor. On PSC motors, substitute "a known to be good" run capacitor if available. If compressor then starts and runs properly, replace the original run capacitor.

If a capacitor tester is not available, an ohmmeter

may be used to check run and start capacitors for shorts or open circuits. Use an ohmmeter set to its highest resistance scale, and connect prods to capacitor terminals.

(a) With a good capacitor, the indicator should first move to zero, and then gradually increase to infinity.

(b) If there is no movement of the ohmmeter indicator, an open circuit is indicated.

(c) If the ohmmeter indicator moves to zero, and remains there or on a low resistance reading, a short circuit is indicated.

Defective capacitors should be replaced.

5. If the correct voltage is available at the compressor terminals, and no current is drawn, remove all wires from the terminals and check for continuity through the motor windings. On single phase motor compressors, check for continuity from terminals C to R, and C to S. On three phase compressors, check for continuity between the terminals for connections to phases 1 and 2, 2 and 3, and 1 and 3. On compressors with line break inherent protectors, an open overload protector can cause a lack of continuity. If the compressor is warm, wait one hour for compressor to cool and recheck. If continuity cannot be established through all motor windings, the compressor should be replaced.

Check the motor for ground by means of a continuity check between the common terminal and the compressor shell. If there is a ground, replace the compressor.

6. If the compressor has an external protector, check for continuity through the protector or protectors.

All external and internal inherent protectors on Copelametic compressors can be replaced in the field. On larger compressors with thermostats, thermotectors, or solid state sensors in the motor windings (D, H, S protection), the internal protective devices cannot be

replaced and the stator or compressor must be changed if the internal protectors are defective or damaged.

(B) If The Compressor Starts But Trips Repeatedly On The Overload Protector

1. Check the compressor suction and discharge pressures while the compressor is operating. Be sure the pressures are within the limitations of the compressor. If pressures are excessive, it may be necessary to clean the condenser, purge air from the system, add a crankcase pressure regulating valve, modify the system control, or take such other action as may be necessary to avoid excessive pressures.

An excessively low suction pressure may indicate a loss of charge, and a suction cooled motor compressor may not be getting enough refrigerant vapor across the motor for proper cooling.

On units with no service gauge ports where pressures can be checked, check condenser to be sure it is clean and fan is running. Excessive temperatures on suction and discharge line may also indicate abnormal operating conditions.

2. Check the line voltage at the motor terminals while the compressor is operating. The voltage should be within 10% of the nameplate voltage rating. If outside those limits, the voltage supply must be brought within the proper range, or a motor compressor with different electrical characteristics must be used.

3. Check the amperage drawn while the compressor is operating. Under normal operating conditions, the amperage drawn will seldom exceed 100% of the nameplate amperage and should never exceed 120% of the nameplate amperage. High amperage can be caused by low voltage, high head pressure, high suction pressure,low oil level, compressor mechanical damage,

defective running capacitors, or a defective starting relay.

On three phase compressors, check amperage in each line. One or two high amperage legs on a three phase motor indicates an unbalanced voltage supply, or a winding imbalance. If all three legs are not drawing approximately equal amperage, temporarily switch the leads to the motor to determine if the high leg stays with the line or stays with the terminal. If the high amperage reading stays with the line, the problem is in the line voltage supply. If the high amperage reading stays with the terminal, the problem is in the motor.

If the amperage is sufficiently unbalanced to cause a protector trip, and the voltage supply is unbalanced, check with the power company to see if the condition can be corrected. If the voltage supply is balanced, indicating a defective motor phase, the compressor should be replaced.

4. Check for a defective running capacitor or starting relay in the same manner described in the previous section.

5. Check the wiring against the wiring diagram in the terminal box. On dual voltage motors, check the location of the terminal jumper bars to be sure phases are properly connected.

6. Overheating of the cylinders and head can be caused by a leaking valve plate. To check, close the suction service valve and pump the compressor into a vacuum. Stop the compressor and crack the suction valve to allow the pressure on the suction gauge to build up to 0 psig. Again close the valve. If the pressure on the gauge continues to increase steadily, the valve plate is leaking. Remove the head and check the valve plate, replace if necessary.

7. If all operating conditions are normal, the voltage

supply at the compressor terminals balanced and within limits, the compressor crankcase temperature within normal limits, and the amperage drawn within the specified range, the motor protector may be defective, and should be replaced.

If the operating conditions are normal and the compressor is running excessively hot for no observable reason, or if the amperage drawn is above the normal range and sufficient to repeatedly trip the protector, the compressor has internal damage and should be replaced.

(C) If The Compressor Runs But Will Not Refrigerate

1. Check the refrigerant charge, and the operating pressures. Any abnormal operating conditions must be corrected.

2. If the suction pressure is high, and the evaporator and condenser are functioning normally, check the compressor amperage draw. An amperage draw near or above the nameplate rating indicates normal compressor operation, and it is possible the compressor or unit may have damaged valves or does not have sufficient capacity for the application.

An amperage draw considerably below the nameplate rating may indicate a broken suction reed or broken connecting rod in the compressor. Check the pistons and valve plate on an accessible compressor. If no other reason for lack of capacity can be found, replace a welded compressor.

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Form 6400-R11